1990/91

ANNUAL REPORT

Province of British Columbia
Ministry of Energy, Mines
and Petroleum Resources

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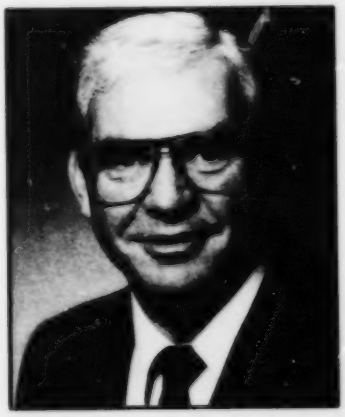
To the Honourable Jack Weisgerber
Minister of Energy, Mines and
Petroleum Resources
Parliament Buildings
Victoria, British Columbia

Sir:

I have the honour to submit the Annual Report of the Ministry of Energy, Mines and Petroleum Resources for the period of April 1, 1990 to March 31, 1991.

John Allan
Deputy Minister

The Honourable David C. Lam
Lieutenant-Governor of British Columbia



May It Please Your Honour:

I respectfully submit the Annual Report of the Ministry of Energy, Mines and Petroleum Resources for the period of April 1, 1990 to March 31, 1991.

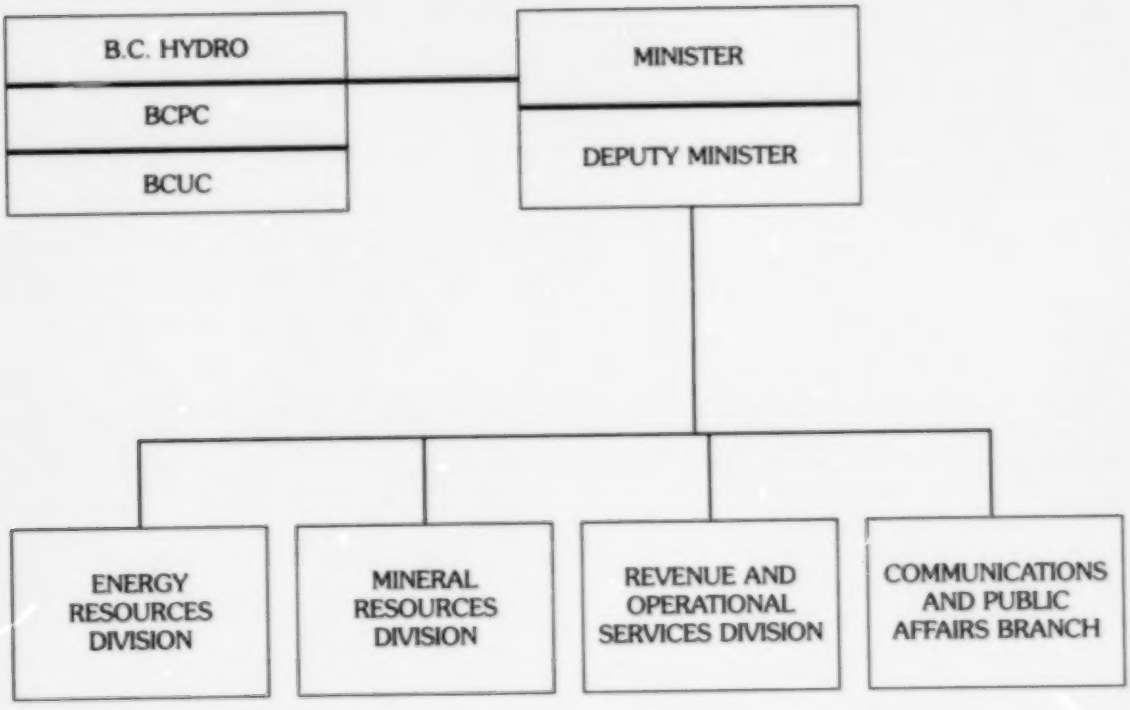
Jack Weisgerber
Minister

In Memoriam

The Honourable Jack Davis passed away during the reporting period of this Annual Report.

Mr. Davis, a B.C. native son and Rhodes Scholar, was associated with natural resource issues all his professional life and played a leading role in public affairs since 1962. He became Canada's first Minister of Environment in Ottawa in 1970 and was B.C.'s Minister of Energy, Mines and Petroleum Resources since 1986.

Ministry Overview



Highlights

Ministry Organization

The Ministry is divided into three Divisions for operating purposes: Energy Resources, Mineral Resources, and Revenue and Operational Services. The three Division heads, along with the Director of Communications and Public Affairs Branch, report directly to the Deputy Minister.

The Ministry had 375 full-time equivalent (FTE) positions for the 1990/91 fiscal year. The FTEs are primarily used for permanent regular full-time positions with a small portion of the FTEs being used for seasonal geological field work staff.

Women's Programs and Employment Equity

The Women's Programs Working Committee (WPWC) has a mandate to ensure women have equal access to job advancement and career development opportunities. During 1990/91, the committee was involved in mentoring, networking and staff training. The committee sponsored two networking functions for women, a mentoring workshop open to all government staff, and trained three Ministry staff as facilitators for the Taking Charge of Your Career course.

A major accomplishment this year was the development of a Skills Inventory Database System (SIDS) — a database of women in the Ministry including their skills, education, experience and career aspirations. SIDS, to be fully operational in April 1991, will help to increase career opportunities in the form of special assignments and secondments for women.

In addition to these accomplishments, the WPWC arranged a Communications Skills Workshop for 14 women in the Ministry and created a Career Path Handbook to help women identify career paths from clerical through to management positions.

The WPWC submitted to the Executive Committee an employment equity proposal targeted towards advancing the careers of women in the Ministry. Some of the specific recommendations included:

- eliminating systemic barriers which were preventing or limiting female employees from maximizing their employment potential in the Ministry; and

- ensuring equal male/female representation in all classifications and levels, particularly in excluded supervisory management classifications.

The Executive Committee took these recommendations a step further and endorsed the concept of a broad employment equity strategy for the Ministry. On March 26, 1991, the Deputy Minister announced the Executive Committee's commitment to develop and introduce an employment equity program that would ensure equal access to employment and promotional opportunities, regardless of race, sex or disability.

The Ministry's employment equity program will challenge the Ministry's staffing and development practices over the next few years to provide equitable employment opportunities to qualified individuals. Through this program, the Ministry will be able to obtain the best people possible.

Ministry Environmental Affairs Committee

In 1990/91, the Ministry's standing Deputy Minister's Forum on Environment and Economy was restructured, and became the Ministry Environmental Affairs Committee (MEAC) comprised of Executive Committee members and other key Ministry staff. At the same time, the earlier information exchange and general discussion orientation was superseded by a more channelled focus on specific environment and economy integration issues.

Among significant issues considered during the year were new provincial policies on native affairs, the work of both the B.C. Round Table on the Environment and the federal Green Plan and Environmental Assessment and Review Process, Parks Plan 90 and Wilderness for the 90s, and newly developing provincial policy on resource roads. MEAC also initiated an Environmental Issue Update circular to inform Ministry staff on the status of key issues.

Communications and Public Affairs Branch

The Communications and Public Affairs Branch supports the Ministry and each Division and Branch through planning, development and delivery of communication programs. This is done through advice, co-ordination and technical assistance to define target audiences; and to design, produce and distribute communication materials, and provide later evaluation and follow-up.

The Branch is also the Ministry's focus for general public inquiries (both telephone and mail), media relations, issue management and advertising. In 1990/91, the Branch produced or assisted with the following initiatives:

- news releases and media alerts (69), industry information letters (44), advertisements (2), press conferences (2), receptions and other events (5);

- printed brochures, pamphlets, booklets, Annual Reports, Business Plans (36);
- conferences, exhibits, tradeshows (9); and
- issue management seminars for Ministry staff (2).

The public is keenly interested in energy efficiency, petroleum exploration and development, mining production and reclamation and, in particular, how these issues relate to a healthy provincial economy and environment. The Branch will continue to ensure the public's needs are met through ongoing communication programs.

Ministry Contacts

(as of March 31, 1991)

Minister's Office

Honourable Jack Weisgerber, Minister

Deputy Minister's Office

John Allan, Deputy Minister
Irwin Henderson, Director, Communications and Public Affairs Branch

Energy Resources Division

Peter Ostergaard, Assistant Deputy Minister
Gordon Douglas, Executive Advisor
Warren Bell, Director, Energy Management Branch
Karen Koncohrada, Acting Director, Oil and Gas Policy Branch
Philip Carter, Director, Electricity Policy Branch
Denise Mullen, Acting Director, Energy Project Analysis Branch
Bruce Hanwell, Director, Engineering and Operations Branch
John MacRae, Director, Petroleum Geology Branch
Gerald German, Director, Petroleum Titles Branch

Mineral Resources Division

Bruce McRae, Assistant Deputy Minister
John Clancy, Special Advisor
Brian Parrott, Director, Mineral Policy Branch
Denis Lieutard, Director, Mineral Titles Branch
Ralph McGinn, Director, Engineering and Inspection Branch
Ron Smyth, Director, Geological Survey Branch

Revenue and Operational Services Division

Joan Hesketh, Executive Director
Alf Lockwood, Director, Mineral Revenues Branch
Bruce Carrison, Director, Petroleum Revenues Branch
Timothy Chatton, Director, Administrative Services Branch
Tom Scharien, Director, Information Systems Branch
Jennifer Smith, Director, Financial Services Branch
Barry Turner, Director, Personnel Services Branch

District Offices

- Fernie
- Fort St. John (Charlie Lake)
  - Mediation and Arbitration Board
- Kamloops
- Nanaimo
- Nelson
- Prince George
- Quesnel
- Smithers
- Vancouver
  - Mineral Titles
  - Engineering and Inspection Branch
  - Geological Survey Branch

Legislation

Legislation administered by the Ministry of Energy, Mines and Petroleum Resources includes the following:

Coal Act
Economic Development Electricity Rate Act (formerly Industrial Electricity Rate Discount Act)
Energy Efficiency Act
Fort Nelson Indian Reserve Minerals Revenue Sharing Act
Gas Utility Act
Geothermal Resources Act
Hydro and Power Authority Act
Hydro and Power Authority Privatization Act
Hydro Power Measures Act
Indian Reserve Mineral Resource Act
Mine Development Assessment Act (unproclaimed as of March/91)
Mineral Land Tax Act
Mineral Prospectors Act
Mineral Tax Act
Mineral Tenure Act
Mines Act
Mining Right of Way Act
Ministry of Energy, Mines and Petroleum Resources Act
Natural Gas Price Act
Petroleum and Natural Gas Act
Petroleum and Natural Gas (Vancouver Island Railway Lands) Act
Petroleum Corporation Act
Pipeline Act: Part 7 (by OIC 468/88)
Power Act (not in Revised Statutes of B.C. 1979)
Utilities Commission Act
Vancouver Island Natural Gas Pipeline Act

Changes During 1990/91

Acts

Energy Efficiency Act
Mine Development Assessment Act (unproclaimed as of March/91)

Amendments

Mineral Tax Act
Natural Gas Price Act

Miscellaneous Amendments

Utilities Commission Act (Section 27)
Hydro and Power Authority Act (Section 45)

Repealed

None

Ministry Expenditures — Standard Expenditure Classifications

	Fiscal Year 1989/90	Fiscal Year 1990/91*
Salaries	$15,924,037	$17,944,550
Supplies and Services	13,353,105	12,419,656
Capital	2,768,049	3,266,775
Other Expenditures (Write Offs)	—	—
Grant (Includes Fort Nelson Revenue Sharing Agreement)	1,023,299	2,383,756
Recoveries (Mineral Development Agreement)	(768,176)	(238,346)
Totals	$32,300,314	$35,776,391

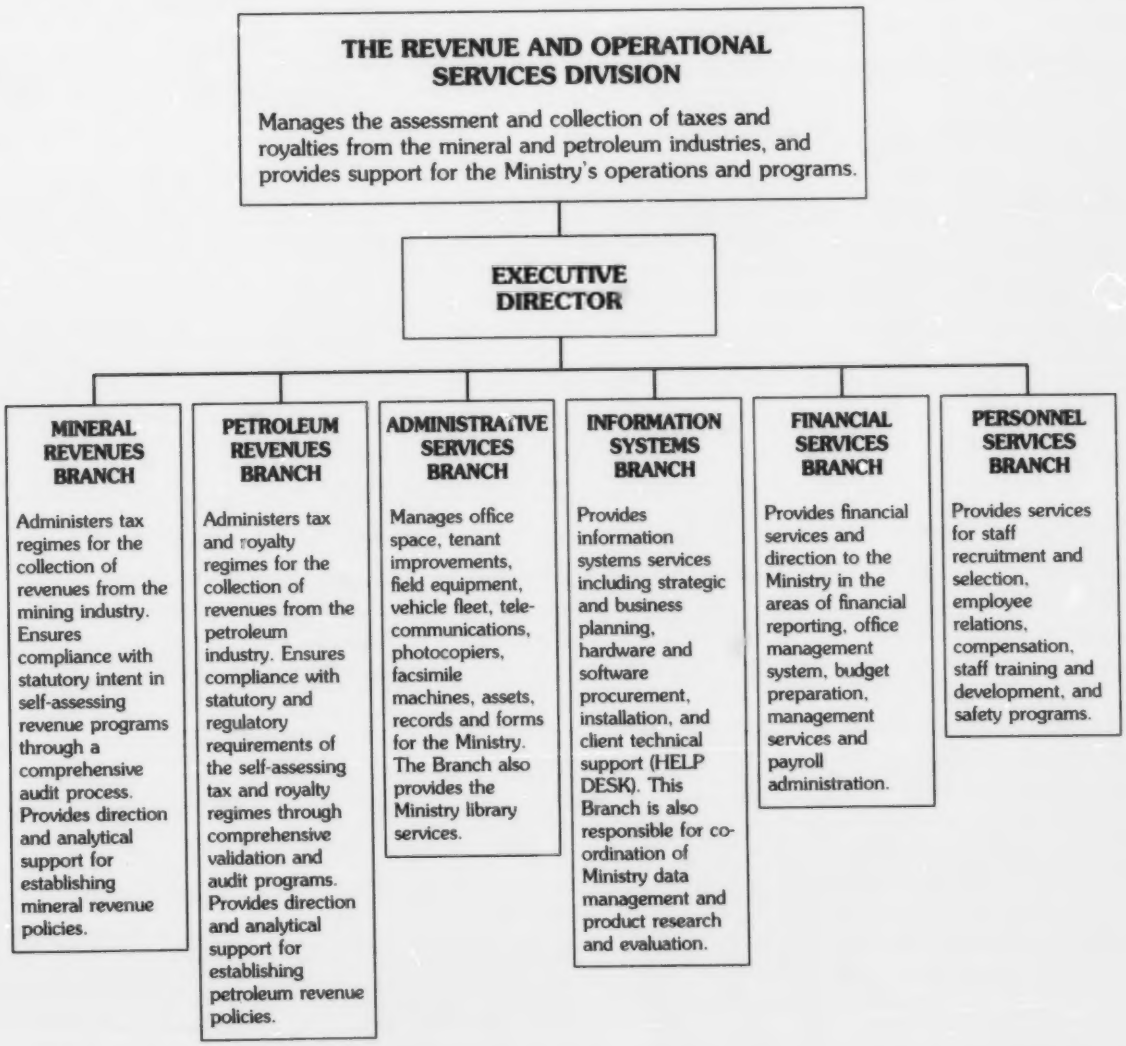
NOTE: * Unaudited.

Details of Expenditures by Appropriations and Activities, and by Standard Expenditure Classification

Summary of Operations	Fiscal Year 1989/90	Fiscal Year 1990/91*
Minister's Office	$282,433	$304,810
Executive Management	551,172	921,551
Revenue and Operational Services	6,008,497	6,266,848
Energy Resources	7,418,010	8,369,829
Mineral Resources	16,395,717	16,857,282
Power and Gas Line Extensions	—	1,624,740
Fort Nelson Indian Band Revenue Sharing Agreement		
Statutory	271,732	265,818
Financial Administration Act Sec. 25 (c) — Interest on Revenue Refunds	1,836	279,267
Mines Act Sec. 17 (2) — Mine Improvement	—	96,359
Mineral Development Agreement (Net of Recoveries)	877,917	304,983
Mineral Exploration Incentives Program	493,000	484,904
Totals	$32,300,314	$35,776,391

NOTE: * Unaudited.

Revenue and Operational Services Division


THE REVENUE AND OPERATIONAL SERVICES DIVISION
Manages the assessment and collection of taxes and royalties from the mineral and petroleum industries, and provides support for the Ministry's operations and programs.
EXECUTIVE DIRECTOR
MINERAL REVENUES BRANCH
Administers tax regimes for the collection of revenues from the mining industry. Ensures compliance with statutory intent in self-assessing revenue programs through a comprehensive audit process. Provides direction and analytical support for establishing mineral revenue policies.
PETROLEUM REVENUES BRANCH
Administers tax and royalty regimes for the collection of revenues from the petroleum industry. Ensures compliance with statutory and regulatory requirements of the self-assessing tax and royalty regimes through comprehensive validation and audit programs. Provides direction and analytical support for establishing petroleum revenue policies.
ADMINISTRATIVE SERVICES BRANCH
Manages office space, tenant improvements, field equipment, vehicle fleet, telecommunications, photocopiers, facsimile machines, assets, records and forms for the Ministry. The Branch also provides the Ministry library services.
INFORMATION SYSTEMS BRANCH
Provides information systems services including strategic and business planning, hardware and software procurement, installation, and client technical support (HELP DESK). This Branch is also responsible for co-ordination of Ministry data management and product research and evaluation.
FINANCIAL SERVICES BRANCH
Provides financial services and direction to the Ministry in the areas of financial reporting, office management system, budget preparation, management services and payroll administration.
PERSONNEL SERVICES BRANCH
Provides services for staff recruitment and selection, employee relations, compensation, staff training and development, and safety programs.

Highlights

Mineral Revenues Branch

The Branch provides resource taxation and financial advice for effective administration and enforcement of Ministry mineral policies and ensures that the Crown receives its fair share of mineral revenues.

The Branch also provides a mineral tax guide, along with advice, instruction, rulings and interpretations, to assist mine operators in achieving voluntary compliance with the filing of the required return. The Branch ensures that the operator's obligation for the taxes imposed by the respective legislation is reliably assessed and paid by comprehensive compliance examination programs that meet high standards of professionalism, timeliness, quality and frequency.

During 1990/91, the Branch implemented the Mineral Tax Act. The Act consolidated four previous provincial tax regimes to become the major provincial legislation for the assessment and payment of coal and mineral taxes to the Province.

An integrated mineral tax information system is being developed by the Branch. This system will provide improved administration of the Mineral Tax Act through effective implementation, compliance, examination, assessment, financial analysis and reliable forecasting of mineral and coal taxation.

Petroleum Revenues Branch

The Branch provides effective and efficient services to meet the statutory mandate to calculate, verify, collect and report the Crown royalties and taxes payable by the petroleum industry.

Phase II of the Petroleum Resource Management System (PRMS) was completed. Phase I of PRMS was completed in the previous year, allowing the Ministry to capture production and sales data provided by the petroleum industry and to calculate and record Crown royalties payable. Phase II of PRMS, using the stored data, provides the capability to produce statistical reports, production and royalty ledgers and validation reports for verifying factors used in the royalty calculation. Also, the database is an information source for analysts to review and make recommendations on royalty policy.

The Audit and Validation section ensures the complete and accurate reporting of Crown royalties. The validation group reviews all Crown royalty returns, examines royalty factors and allowances and reconciles oil, gas and by-product volumes and values to third party reports. The external audit group performs audits at the royalty payers' place of business, concentrating on high risk areas such as oil pricing, by-product sales values and prices and sulphur production, sales and price. Over 548 reassessments were issued during the year, accounting for additional revenues in excess of $2 million.

The Branch, in co-operation with the Oil and Gas Policy Branch, implemented the Posted Minimum Price (PMP) in the natural gas royalty calculation to protect the Crown's revenue share from discount pricing of natural gas.

The Petroleum and Natural Gas Royalty Handbook was updated. This provided industry with a complete manual to cover the Act, Regulation and Procedures on reporting requirements covering production, disposition, royalty calculation and payment for petroleum and natural gas.

Administrative Services Branch

In 1990/91, the Branch assisted in a number of support requirements for the Ministry's new consolidated Victoria office building, targeted for construction completion in 1993. These included:

- Publication of the "Advanced Energy Efficient Buildings" report.
- Revision of the "Leased Building Requirements" document.
- Regular meetings of the Design and Planning Committee.
- The purchase of open space furniture.
- Terms of reference for a file space reduction study.

Other accommodation issues included the relocation of several offices and branches and the initial planning to move other branches in the coming fiscal year. This will move all of the Victoria offices into a centralized core area of the city until the consolidated headquarters building is completed.

The Branch participated in meetings with the federal Department of Communications regarding the development and deployment of the Mobile Satellite System for field communications. As well, the Branch has evaluated an enhanced asset management control system for the coming fiscal year.

This fiscal year, Administrative Services established a "first-ever" agreement with the B.C. Buildings Corporation to assess office space for hazards associated with earthquakes. Also, it negotiated a sales agreement with the Purchasing Commission for recovery of revenue for assets sold by the Commission.

The Branch oversaw the contracting out of its internal mail distribution service in Victoria to FASTRAC Incorporated and assisted in the consolidation of a number of equipment and rock storage areas around the province, resulting in considerable cost savings to the Ministry.

The Library, open to the public, industry and other government agencies as well as Ministry staff, has approximately 15,000 titles in the automated catalogue and another 20,000 volumes of government geological reports and maps. In 1990/91, approximately 1,500 reference questions were answered, along with 150 inter-library loans obtained for staff and 315 book orders placed. The Library also helps maintain the district office libraries by ordering and cataloguing their new acquisitions.

Information Systems Branch

With the continued rapid growth of the use of technology to support program delivery, the Branch has expanded its role in support of the Ministry's major systems' initiatives. There are three major projects underway. These are:

- The Petroleum Information Management System (PIMS). This new database system is being implemented to enhance the Ministry's capability to manage the province's petroleum and natural gas resources.
- The Mineral Data Administration system (MiDA). This new system has been developed to provide secure and accurate title information for Crown mineral and coal lands. This system will also be used to provide timely and accurate maintenance of mapping information.
- The Gas Administration and Management System (GAMS). This system is currently under development and will be used to track proven and probable reserves of natural gas in B.C. This system will also manage the uncontracted and contracted components of the natural gas resource.

The number of electronic mail users within the Ministry has grown extensively. New initiatives are planned in the areas of electronic data interchange, data resource management and processing alternatives.

Financial Services Branch

Following the successful pilot test late in 1989/90, the Branch proceeded with ministry-wide implementation of the Office Management System (OMS).

OMS serves as a "front-end" to the Government Management and Control System (GMACS) financial system, which transfers and receives financial data to and from the central accounting and government payroll systems at the Ministry of Finance. With OMS, cost centre managers can enter commitments and expenditures, run current financial reports at any time and make supplier inquiries to determine status of payments.

To implement OMS, many staff who had not previously dealt with a financial computer system received training. The Branch installed a Local Area Network (LAN) and, with the assistance of the Information Systems Branch, introduced electronic transfer of data from user sites to a central Financial Services Branch site. In addition, special reporting requirements of Divisions were met. Further enhancements are planned for 1991/92.

Several changes were introduced in 1990/91 which impacted the Branch, amongst these were:

- Government restrictions on spending, which required monitoring.
- The Goods and Services Tax which impacted revenue and purchasing practices. A special training seminar was held for Ministry staff and management.
- Diners Club Charge Card for staff travel.
- Significant changes to the government payroll system at the end of the fiscal year.

Key activities during the year included budget monitoring and preparation support, the annual fees and licence review, and payments to staff and suppliers at high standards of accuracy and timeliness.

Personnel Services Branch

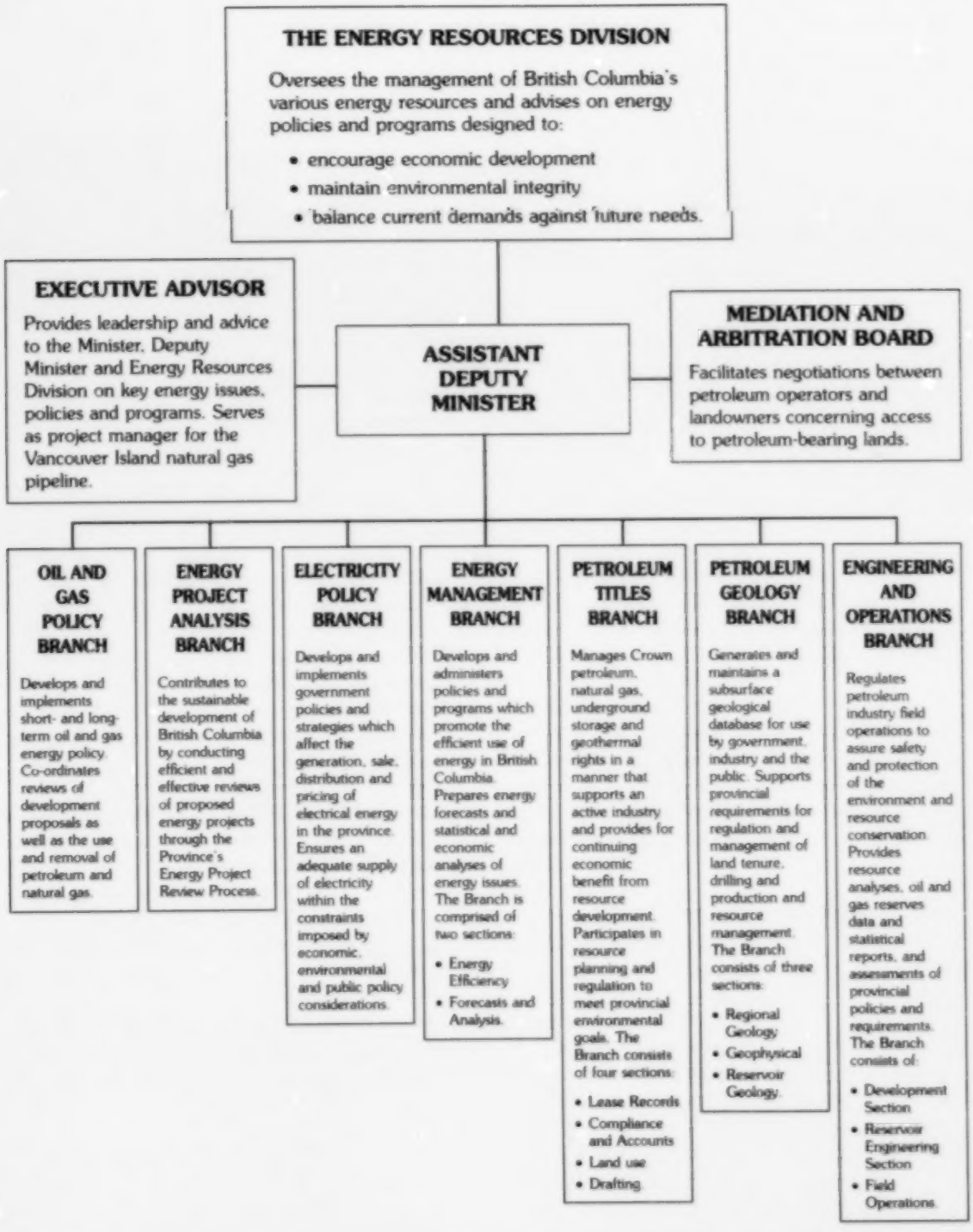
The Branch provides staff support to Ministry management and leadership in personnel issues to ensure a qualified, effective, committed and well-organized workforce is in place to achieve organizational objectives. The Branch provides services to staff on personnel matters and to the general public seeking employment with the Ministry.

Operational activities in 1990/91 included: recruitment and selection programs; organization and job classification issues; employee relations; application of employment policies, training, and development programs; workplace health and safety; and the establishment of ministry-focused personnel policies.

Specific project initiatives launched by the Branch in 1990/91 include:

- Development and implementation of an orientation program.
- Development and introduction of a ministry-specific training policy.
- Initiation of a strategy to decentralize and enhance funding for training activities.
- Initiation of a program which resulted in the delegation of staffing authority to line management.

Energy Resources Division


THE ENERGY RESOURCES DIVISION
Oversees the management of British Columbia's various energy resources and advises on energy policies and programs designed to:
• encourage economic development
• maintain environmental integrity
• balance current demands against future needs.
EXECUTIVE ADVISOR
Provides leadership and advice to the Minister, Deputy Minister and Energy Resources Division on key energy issues, policies and programs. Serves as project manager for the Vancouver Island natural gas pipeline.
ASSISTANT DEPUTY MINISTER
MEDIATION AND ARBITRATION BOARD
Facilitates negotiations between petroleum operators and landowners concerning access to petroleum-bearing lands.
OIL AND GAS POLICY BRANCH
Develops and implements short- and long-term oil and gas energy policy. Co-ordinates reviews of development proposals as well as the use and removal of petroleum and natural gas.
ENERGY PROJECT ANALYSIS BRANCH
Contributes to the sustainable development of British Columbia by conducting efficient and effective reviews of proposed energy projects through the Province's Energy Project Review Process.
ELECTRICITY POLICY BRANCH
Develops and implements government policies and strategies which affect the generation, sale, distribution and pricing of electrical energy in the province. Ensures an adequate supply of electricity within the constraints imposed by economic, environmental and public policy considerations.
ENERGY MANAGEMENT BRANCH
Develops and administers policies and programs which promote the efficient use of energy in British Columbia. Prepares energy forecasts and statistical and economic analyses of energy issues. The Branch is comprised of two sections:
• Energy Efficiency
• Forecasts and Analysis.
PETROLEUM TITLES BRANCH
Manages Crown petroleum, natural gas, underground storage and geothermal rights in a manner that supports an active industry and provides for continuing economic benefit from resource development. Participates in resource planning and regulation to meet provincial environmental goals. The Branch consists of four sections:
• Lease Records
• Compliance and Accounts
• Land use
• Drafting
PETROLEUM GEOLOGY BRANCH
Generates and maintains a subsurface geological database for use by government, industry and the public. Supports provincial requirements for regulation and management of land tenure, drilling and production and resource management. The Branch consists of three sections:
• Regional Geology
• Geophysical
• Reservoir Geology
ENGINEERING AND OPERATIONS BRANCH
Regulates petroleum industry field operations to assure safety and protection of the environment and resource conservation. Provides resource analyses, oil and gas reserves data and statistical reports, and assessments of provincial policies and requirements. The Branch consists of:
• Development Section
• Reservoir Engineering Section
• Field Operations.

Energy Resources Division

The Oil and Gas Industry in 1990/91

Construction of the Vancouver Island natural gas pipeline continued in 1990/91. The underwater portion of the line was installed by the reelship Apache in the fall of 1990. Construction on the Island portion started and approximately half the stream crossings were completed.

Gas service to Squamish, the Sunshine Coast and Powell River and to the Woodfibre and Port Mellon pulp and paper mills is expected in July and August 1991. Service to all Island communities and the pulp mills at Powell River, Elk Falls, Port Alberni, Harmac and Crofton is expected in September and October 1991.

The Commission of Inquiry into Fraser Valley Petroleum Exploration commenced public hearings in May, followed by technical hearings in late August. Ministry staff participated in the technical hearings held in Langley by presenting testimony on issues identified during the public meetings and reviewed Inquiry Commissioner David Anderson's report in February 1991.

In April 1990, British Columbia became a signatory to the Energy Supplies Allocation Board Memorandum of Understanding. The Memorandum is a general commitment to principles outlining the co-ordination of efforts which the federal, provincial, and territorial governments would undertake should a severe petroleum shortfall occur.

Following Iraq's invasion of Kuwait in August, British Columbia joined with the federal government and other provinces in stepping up contingency planning to prepare for possible oil shortages. Demand restraint measures were evaluated for effectiveness in achieving fuel efficiency in all sectors. During the crisis, the Ministry published the Oil Market Update to give current information on oil and oil-product demand, supply and issues raised by oil price increases.

A FUEL SMART program to encourage oil conservation was also initiated. This is a long-term program designed to help consumers use oil more efficiently and is intended to reach all sectors — industry, business, government and the general public.

Revenue from petroleum tenure administration amounted to $157 million in 1990/91. This was a 10-year high and the fourth best overall in the province's history. The industry continued to show enthusiasm for B.C.'s natural gas potential by increased activity throughout the northeast sector.

The most noteworthy gas development during the year was in the Ring Border Field which straddles the B.C./Alberta border. The volumetric gas-in-place is estimated at 640 Bcf in this field.

Exploratory drilling continued in the southern foothills area. This led to significant gas reserves additions from the Pardonet and Baldonnel Formations in the Sukunka and Bullmoose West Fields.

In the northeastern plains, delineation and development drilling activity occurred in the Rigel, Noel/Sundown, Helmet North, Eagle, Montney and Buick Creek Field areas, and resulted in significant new reserves of gas and oil. Other key development areas were the foothills near the Pine River plant and Klua near the Fort Nelson plant area.

A significant exploratory wildcat well was drilled to 2,221 metres at Chevron Mobil Flathead c-22-H/82-G-2 to evaluate the hydrocarbon potential of deeper portions of the Flathead Basin.

In the Brassey Artex oil pools, a fully miscible oil recovery scheme is successfully underway. This operation includes re-injection of all produced gas supplemented by additional gas from other nearby pools. All production oil allowables were waived as the miscible scheme is working well based on the historical performance.

The Fort St. John district office became increasingly involved with surface land use planning on Crown lands, mainly due to proposed drilling in sensitive areas. The office also participated in a variety of land use issues including the Parks and Wilderness for the 90s program and Forestry's new timber supply area integrated resource use planning for the forest districts of Fort Nelson, Fort St. John and Dawson Creek.

The Sikanni sour gas plant, owned and operated by Total Petroleum Canada Limited, started up in October 1990. The plant, which is located 190 kilometres northwest of Fort St. John on the Buckinghorse River, is capable of processing 1,310 10^3m^3/day (46.2 MMCFD) of raw, sour gas.

Amerada Hess Canada Ltd. commenced construction of its Boundary Lake sour gas processing plant, which is located 48 kilometres east of Fort St. John. It will be capable of converting up to 1,296 10^3m^3/day (46 MMCFD) of sour, raw gas and will yield over 230 m^3/day (1,440 B/D) of condensate.

Canadian Hunter Exploration Ltd. commenced construction of a gas processing plant in the Ring Field area, 170 kilometres northeast of Fort St. John, just west of the B.C./Alberta border. The plant, which is expected to start up in late 1991, will process up to 2,440 10^3m^3/day of sweet, raw gas and will yield over 200 m^3/d (1,260 B/D) of condensate.

Industry interest in coalbed methane increased in 1990/91 — particularly in the Fernie and Flathead areas of southeastern B.C. Three test hole drilling programs in the Flathead Valley preceded a $2.5 million permit sale. A test hole program was also drilled in the Elk Valley.

The Electricity Industry in 1990/91

British Columbia's new energy policy provides a framework for the development and use of the province's electricity resources. It emphasizes planning and conservation initiatives which promote the more efficient use of existing resources and delay the need for new higher-cost generation projects. It also encourages private sector participation in the electricity industry, to increase competition and diversify resource options.

B.C. Hydro applied to the B.C. Utilities Commission (BCUC) in January 1991 to restructure its rates. Under Hydro's existing rate structure, the average price per kilowatt-hour of electricity consumption for residential and commercial customers decreases as usage increases. B.C. Hydro proposes to gradually re-align the rate structure so that over time the price per kilowatt-hour of electricity consumption will increase as consumption exceeds a basic level. This type of rate structure should provide pricing signals which encourage conservation. A public hearing into the application is expected before the end of 1991.

The Province's electricity policy encourages the efficiency gains which are expected through increased competition. In January 1991, the B.C. Power Export Corporation changed its name to the B.C. Power Exchange Corporation (POWEREX); this recognizes the multiple services POWEREX provides to both B.C. Hydro service area customers and generators, and to entities outside the B.C. Hydro service area, including those outside British Columbia.

In consultation with the Ministry, POWEREX continued the development of a Power Exchange Operation (PEO). The PEO is a short-term marketing operation, which will use inter-connected utility electric systems and reservoirs to buy, sell, transmit, store and provide other electricity services. Participation in the PEO will also be open to producers and consumers in Alberta and the U.S. The PEO, which has been designated a regulated project under the Utilities Commission Act, is expected to be operational during 1991. It will enable participants to take advantage of competitive opportunities and realize efficiency gains from existing facilities.

Major electricity users in B.C. can also purchase electricity directly from alternative producers at negotiated rates, by accessing the provincial transmission system. Such access is an important element in increasing competition in the electricity industry.

During the year, B.C. Hydro signed Electricity Purchase Agreements with nine Independent Power Producers (IPPs) for electricity supply to the domestic market. The projects range in size from less than five MW to 105 MW, and include hydroelectric, woodwaste and natural gas cogeneration projects. The projects are still being planned or are under construction, but once completed, they will add diversity to B.C. Hydro's resource portfolio.

British Columbia's electricity export policy emphasizes private sector development of generation projects to serve the long-term firm export market. POWEREX was originally established as the province's sole export agency to promote a co-ordinated approach by British Columbia IPPs to the U.S. market, with the expectation of ensuring better returns to IPPs.

The U.S. market has changed since the creation of POWEREX in 1988. In January 1991, to reflect these changes in the market and to respond to the concerns of a number of potential B.C. export project proponents, IPPs have been given the option to negotiate directly with customers in the U.S.

IPPs will still need to arrange wheeling services on both sides of the border through POWEREX. POWEREX is continuing negotiations with Bonneville Power Administration (BPA) to improve access to their transmission system, to facilitate firm power exports by independent producers to the U.S.

Negotiations and studies are continuing between B.C. Hydro and BPA concerning technical issues related to the orderly return of the Canadian Entitlement to the Columbia River downstream power benefits (DSBs), which become available beginning in 1998. The DSBs represent an environmentally and financially free resource, since the facilities are already in place, and may delay the need to build new major generation capacity in B.C. by two to three years. The Province is considering various options for disposition and use of the DSBs within British Columbia.

Energy Projects in Review

Energy project review activity remained comparable to the 1989/90 fiscal year. Independent power producers continued to have discussions with Ministry staff regarding potential projects that may be proposed in response to future proposal calls by B.C. Hydro.

Review continued on three proposals submitted by proponents who were short-listed by B.C. Hydro in 1989 for the sale of electricity to the domestic market. In addition, three of the seven small hydro proponents who have Electricity Purchase Agreements with B.C. Hydro, submitted Energy Project Certificate applications.

Centra Gas Vancouver Island and Squamish Gas Co. submitted applications for the distribution of natural gas from the Vancouver Island natural gas pipeline.

Energy Policy Initiatives

In November 1990, the Ministry released an energy policy document entitled "New Directions for the 1990s" which describes a number of current initiatives in energy policy as well as some changing issues and initiatives for the decade ahead.

Four central and inter-related themes for energy policy were identified:

Efficient Energy: Cutting energy waste lowers consumer energy bills, benefits the environment, and makes British Columbia industry more competitive.

Clean Energy: Shifting to cleaner fuels and reducing the environmental impacts of energy supply and use will help the quality of our air, water, and other natural resources.

Secure Energy: Managing existing resources effectively, finding new sources of supply, increasing fuel choice for consumers, and maintaining the quality and quantity of energy supplies will ensure long-term energy security for the province.

Energy for the Economy: Developing energy resources across British Columbia will stimulate regional growth and bring economic benefits to the province as a whole.

Highlights

Oil and Gas Policy Branch

In May 1990, the Ministry released a policy paper outlining B.C.'s new natural gas removal policy. This new policy, which was implemented on November 1, achieves the final step in the deregulation of natural gas markets through the following key initiatives: elimination of the Border Price Test and Mandatory Surplus Test, a more flexible reserve dedication process and the implementation of a natural gas market information monitoring system. The first issue of the Natural Gas Market Update was released in January 1991. This publication is designed to enhance the flow of information to buyers and sellers in the newly-deregulated markets.

During the 1990/91 fiscal year, the Ministry issued 57 Energy Removal Certificates (ERCs) — seven long-term firm, 25 short-term firm and 25 short-term interruptible. The following table shows the number of ERCs moving gas to the U.S. export market and total volumes moved. The majority of this gas went to the U.S. Pacific Northwest, with smaller volumes to California.

Number of ERCs Moving Gas to U.S.

	1989/90	1990/91	% Change
Long-term firm	2	5	150.0
Short-term firm	24	38	58.3
Short-term interruptible	31	34	9.6
Total ERCs	57	93	63.1
Volume moved (PJ)	167.4*	197.3	17.8

Note: * Includes volumes moved under Westcoast Energy Inc. Export Licence GL-41.

The remaining 16 ERCs — three long-term firm, four short-term firm and nine short-term interruptible, removed 24.8 PJ (615.3 10^6m^3) of gas to other Canadian markets, primarily Ontario. This was an increase of 77.1 per cent from 1989/90.

In August 1990, B.C. Petroleum Corporation transferred its natural gas marketing operations to a producer-owned company, CanWest Gas Supply Inc. This successful transfer to the private sector was an essential component of government's deregulation of the British Columbia natural gas industry.

The Branch administered the Power and Gas Extension Program (PGEP) with the two key objectives of promoting regional economic development and making clean, low cost energy available to as many British Columbians as possible. PGEP provided financial assistance for extensions that could not meet the B.C. Utilities Commission financial mains extension test for gas utilities. In 1990/91, PGEP provided $4 million to extend natural gas service to 2,750 customers in 24 communities in the northern and interior regions of the province, and propane gas distribution and conversion in Revelstoke.

The Branch participated in the following three inter-ministry or inter-governmental committees regarding offshore oil concerns:

- The inter-ministry committee to formulate an action plan implementing the recommendations of Special Advisor David Anderson on Oil Transportation and Oil Spills.
- The U.S./B.C. Oil Spill Task Force to review common oil spill concerns. The final report was released in October 1990.
- The provincial Oceans Policy Committee formed in response to federal initiatives related to oceans policy, including oil transportation and international boundaries.

Electricity Policy Branch

In July 1991, a co-ordination agreement was signed with the Bonneville Power Administration (BPA) to extend and enhance a previous agreement dealing with Columbia River non-Treaty Storage. Under this new agreement, 750 GW.h annually of firm generation will be added to B.C.'s integrated system between 1990 and 2003 through efficient use of existing facilities.

In December 1990, a one-year extension to the water power rentals freeze, in effect since 1985, was announced.

In January 1991, B.C. Hydro, POWEREX, and BPA signed a 20-year Interconnection and Exchange Agreement to facilitate continued electricity trade between the parties. Also in January, B.C. Hydro filed an application with the BCUC to restructure its rates to promote conservation and the more efficient use of electricity.

Energy Project Analysis Branch

The Branch's efforts in 1990/91 focused on various independent power producer proposals for the domestic and export markets. This included the co-ordination of the review process for 21 projects.

A variety of project proposals were reviewed in the fiscal year as part of the Energy Project Review Process. Several projects were approved under section 19 of the Utilities Commission Act. These were the Williams Lake woodwaste generating station, the Ring Border and Boundary Lake gas processing plants in northeastern B.C., a small hydro project near McBride, the Howe Sound Pulp and Paper cogeneration facility and the Centra Gas Vancouver Island natural gas distribution facilities for Vancouver Island and the Sunshine Coast.

Two of the five proponents expressing interest in the electricity export market submitted prospectuses for review. These proponents are currently developing more detailed proposals. The Branch also reviewed two proposals for woodwaste projects in the southern part of the province and seven other projects.

Branch staff were also involved in a number of special projects including the Ballard Bus Demonstration Project using hydrogen fuel cells and ongoing activities in the development of a Clean Air Strategy for B.C. In addition, the Branch represents the Ministry on the Major Project Review Process Steering Committee and provides comments on major project proposals.

Energy Management Branch

The Energy Management Branch, which was created in early 1990 to promote the efficient use of energy, introduced several new programs and policy initiatives in 1990/91.

New energy legislation was passed by the legislature in July 1990. The Energy Efficiency Act allows the Province to set minimum energy efficiency standards for household appliances, lights, motors and other equipment sold in B.C. Standards introduced under the Act will provide protection to consumers and will complement utility efficiency programs, like B.C. Hydro's Power Smart and West Kootenay Power's Power $ense programs.

The Ministry and B.C. Hydro also developed minimum energy efficiency standards for new residential buildings. These standards, along with standards for commercial buildings, have been proposed for inclusion in the B.C. Building Code.

In February 1991, the Ministry launched Fuel Smart, a program designed to reduce oil consumption and increase energy efficiency, particularly in the transportation sector. Fuel Smart programs include driver training and pilot rideshare projects.

During 1990/91, the Energy Management Branch also introduced two new programs to provide financial assistance to new customers of the Vancouver Island natural gas pipeline. The $25-million Clean Choice program offers grants to residential and commercial customers converting from oil and electricity to natural gas, while the $30-million Large Industrial Conversion Assistance program provides funding to the major large industrial customers of the pipeline, seven pulp and paper mills.

The Forecasts and Analysis Section of the Branch completed and published a long-term Energy Supply and Requirements Forecast and completed a number of economic and analytical studies.

The Branch also produced the Energy Market Update, a quarterly publication of current B.C. energy statistics and market information.

Petroleum Titles Branch

Crown petroleum and natural gas tender bonus revenue totalled $121 million, a 39 per cent increase over the previous fiscal year. The 1990/91 bonus amounts were the best during the decade and the fourth best ever in B.C.'s history.

The total number of tenures administered by the Branch as of March 31, 1991, increased by 300 over the same date in 1990, with a corresponding increase in hectares of oil and gas rights held under tenure. Tenure acquisitions occurred throughout the entire northeast region of the province with special emphasis on the Rocky Mountain foothills and areas prospective for natural gas in the Jean Marie Formation northeast of Fort Nelson.

A number of inquiries were received concerning the prospects for coalbed methane in British Columbia. This resource has proven to be of significant economic importance in the U.S. The Branch commissioned an independent review of coalbed methane ownership and administrative practices in B.C. and in other jurisdictions.

The Lease Rental Reduction program was phased out after a review and analysis of its effectiveness indicated it was no longer an important factor in the industry's exploration decisions. The Fee, Rental and Work Requirements Regulation was revised, increasing the miscellaneous fees charged by the Branch. These fees had not been increased since 1982.

The Branch was restructured with the creation of two new positions. A Drafting Co-ordinator was hired to increase the Branch's effectiveness in providing drafting services to the Division. A Land Use Officer was hired to increase the Branch's capability in responding to emerging land use issues, and to insure that petroleum issues are adequately addressed in the integrated resource management decision-making process.

Phase I of the Petroleum Titles computer system upgrade is now fully operational. This system maintains information on the Province's petroleum and natural gas tenures which is made available to the oil and gas industry in an electronic format. Phase II of the project, involving the automation of the Branch's accounts receivable function, is underway and is targeted for completion by November 1991.

Petroleum Geology Branch

In 1990/91, the Petroleum Geology Branch responded to increasing levels of industry activity by filling both existing staffing vacancies and by co-ordinating the purchase and installation of a geological well log analysis workstation and Microvax computer and additional required hardware and software.

The addition of these resources enabled the Branch to implement a more rigorous and thorough system of reserves mapping and quantification. This, in turn, facilitated examination of applications for Energy Removal Certificates (ERCs), including the large Alberta and Southern ERC application.

Branch contributions to the development of both the Petroleum Information Management System (PIMS) and the Gas Administration Management System (GAMS) in 1990/91 were significant. In addition, major geological input was provided to a review of the Drilling and Production Regulation.

In response to new development drilling activity, the Reservoir Geology Section conducted major geological reviews in the Helmet North, Ring, West Sukunka, Rigel, Sierra and Buick Creek Fields. The Section also investigated options for addition of an automated drafting capability.

The Branch processed an increased number of lease continuation applications and land use and other tenure evaluations, including a review of undiscovered reserves potential under Fort Nelson Indian Band lands in the Clarke Lake and Roger Field areas.

The Regional Geology and Geophysical Sections completed a major revision of the northeastern British Columbia 1:100,000 regional structure and isopach map series. These maps and all other Branch publications are now available to clients through a distribution agreement with Crown Publications Inc.

Due to a rapidly increasing interest in coalbed methane, the Branch began preparation of a paper on the Coalbed Methane Potential of Southeastern British Columbia. This study will be published in June 1991 and presented at the 1991 Canadian Society of Petroleum Geologists conference.

The Branch and the Coal Resource Unit of the B.C. Geological Survey investigated options for joint resource assessment studies of provincial coalbed methane resources and other potential areas for co-operation. The Branch also continued joint project initiatives with the Geological Survey of Canada's Cordilleran Division and Institute of Sedimentary and Petroleum Geology.

Exhibits or presentations were also prepared and delivered to the annual meeting of the Canadian Society of Petroleum Geologists; the annual meeting of the Pacific Section, Geological Association of Canada (History of B.C. Oil and Gas Exploration); and a U.B.C. student/industry/government oil and gas seminar. The oil and gas core display for the Deputy Minister's office was also completed and installed.

The Branch embarked upon a significant service quality initiative in co-ordinating the preparation of Toolkit for the B.C. Explorer, a day-long seminar. This seminar, scheduled for June 1991, will provide a comprehensive background in B.C. petroleum and natural gas exploration from geological, engineering, land tenure, transportation and processing perspectives.

Engineering and Operations Branch

The Branch experienced another active year in responding to continued near record levels of industry activity.

The Petroleum Information Management System (PIMS) project prime contractor, Coopers and Lybrand, commenced work in December 1990, on design of the systems software. The project is scheduled for implementation by January 1992.

The Gas Administration Management System (GAMS) project, consisting of a Geographical Information System (GIS) component and a database component, entered the design phase in January 1991. PAMAP Technologies Corporation was awarded the contract for the GIS portion and D.M.R. Group Inc. won the contract for development of the database portion. This system, intended to facilitate the processing of applications for approval of gas exports and future monitoring of export volumes, will have the initial phase implemented by mid-summer 1991.

The review and revision of the Drilling and Production Regulation neared completion. A draft version was submitted to various industry associations in November 1990 for comment prior to formal approval through an order-in-council.

An analysis of orphan wells (wells without an identifiable owner) was initiated to examine the extent of the impact on the province. Approximately 20 such wells are currently known to exist. These wells, with little or no real present value, represent a significant liability to B.C.

Branch staff was increased by a total of four FTEs. Two engineers were hired for the Victoria office and two inspectors for the Fort St. John district office.

The Branch continued its involvement, both financial and technical, in the development by the Canadian Standards Association (CSA) of a standard for the storage of hydrocarbons in underground reservoirs.

The Fort St. John district office participated in the Service Quality B.C. initiative and was an integral part of the pilot project of the Fort St. John Service Quality Council.

Development engineering staff commenced discussions with the Engineering and Inspection Branch of the Municipal Affairs Ministry to develop Emergency Response Plan guidelines for sour gas pipeline projects.

Petroleum Titles Activities

Activity — Titles Administered	as of March 31, 1990		as of March 31, 1991	
	Number	Hectares	Number	Hectares
Permits	98	1.2 million	85	1.2 million
Leases	6,592	3.4 million	6,751	3.4 million
Drilling Licences	449	1.1 million	606	1.3 million
Totals	7,139	5.7 million	7,442	5.9 million

Provincial Revenue from the Petroleum Industry ($ Millions)

	1988/89	1989/90	1990/91
Rentals and Fees	33	33	36
Crown Reserve Dispositions	112	87	121
Oil Royalties	38	42	48
Natural Gas and Natural Gas By-Product Royalties	58	63	72
Totals	241	225	277

Value of Hydrocarbon Production ($ Millions) — value to the producers at the wellhead

	1988/89	1989/90	1990/91
Crude Oil	211	287	310
Natural Gas	371	472	535
Natural Gas By-Products	16	30	44
Totals	598	789	889

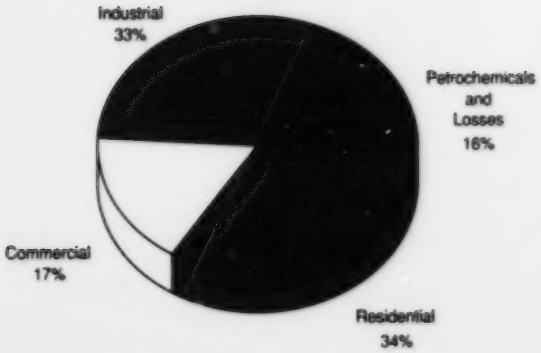
Natural Gas Consumption by Sector

1990

Total: 239 PJ

- Domestic natural gas consumption increased 3.7 per cent per year between 1980 and 1990.
- Demand is projected to increase by 2.4 per cent per year to the year 2010, including sales to the Vancouver Island natural gas pipeline.
- Total natural gas requirements include end-use consumption, pipeline fuel and gas burned in thermal plants to generate electricity.

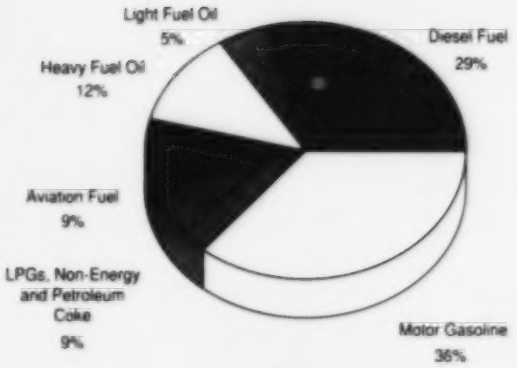
2010



Total: 376 PJ

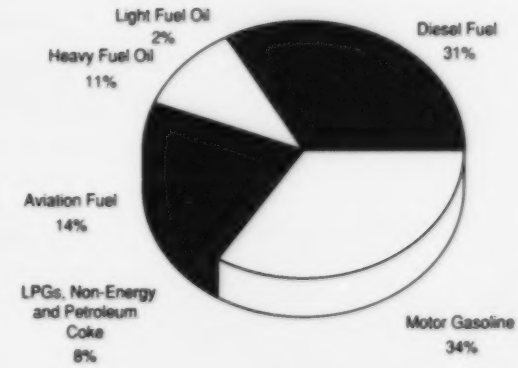
Oil Consumption by Fuel

1990



Total: 357 PJ

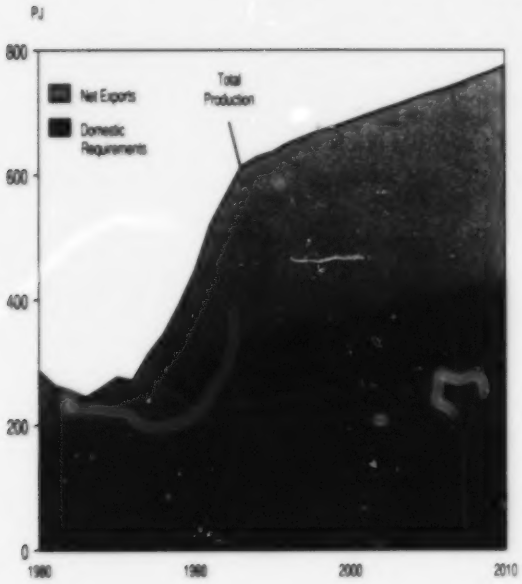
2010



Total: 401 PJ

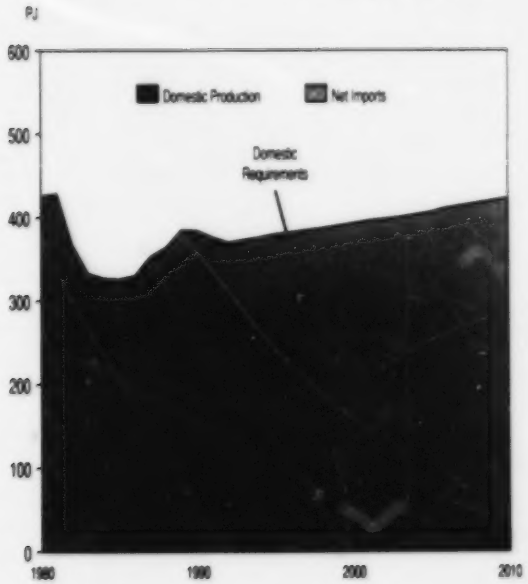
- Over 60 per cent of petroleum product demand in B.C. comes from the transport sector.
- While oil has largely been replaced in other uses by electricity and natural gas, there are few economical substitutes for gasoline.
- Transportation requirements are projected to increase by 1.1 per cent per year to the year 2010.
- The Vancouver Island pipeline will displace heavy fuel oil in seven pulp mills and light heating oil in the residential/commercial sector. By 2010, a total of 19.5 PJ per year will be displaced.
- Total petroleum product consumption is expected to remain stable.

Natural Gas Supply and Requirements



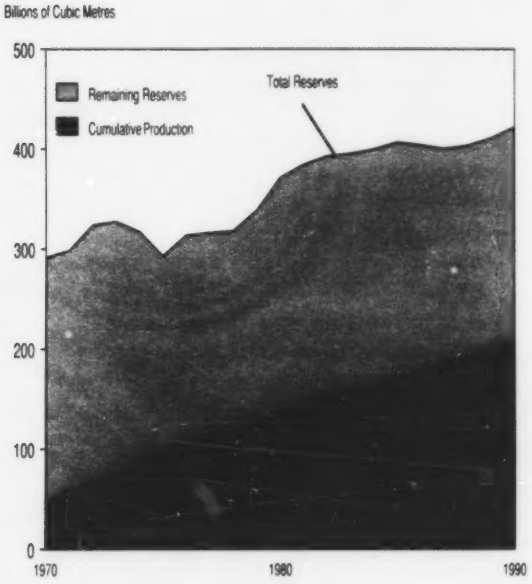
- Sufficient reserves are available to support the development of new export and domestic markets well into the 21st century.
- Domestic burner-tip prices for gas average $4.66 per GJ for residential customers and $2.08 per GJ for industrial customers.
- Deregulation and declining productive capacity in the U.S. have opened new market opportunities for B.C. gas producers.
- Potential sales to California could boost production to 16 billion cubic metres in the mid-1990s.

Oil Supply and Requirements



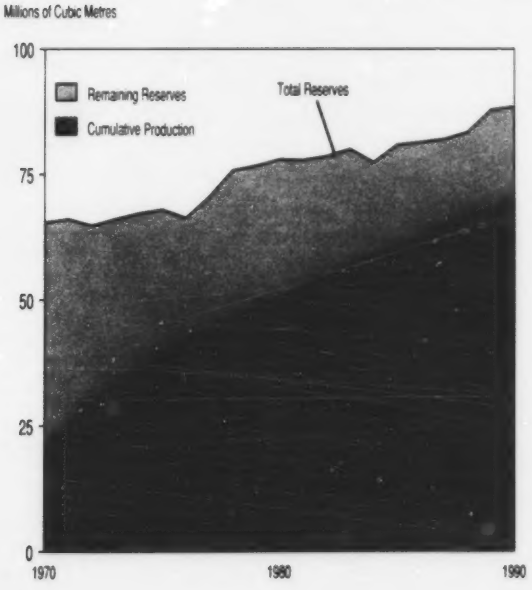
- B.C. depends on Alberta for approximately 80 per cent of its oil supply.
- Declining provincial reserves will result in future increases in imports from Alberta or offshore.
- There have been two major B.C. oil finds in the last 10 years, including a 1988 find of 80 PJ at Brassey. These will help to slow the decline in domestic production.
- Total B.C. refining capacity stands at about 9.7 million cubic metres per year.

Growth in Raw Gas Reserves



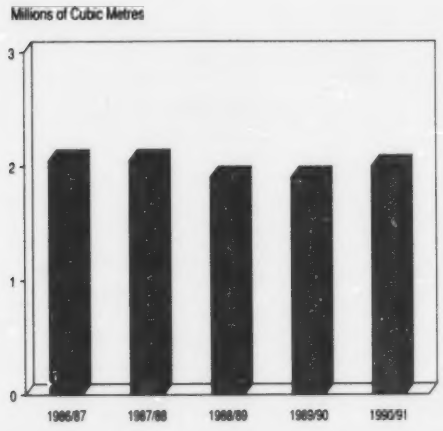
- The most notable recent gas discovery was in the Ring-Border area northeast of Fort St. John.
- Annual gas production is offset by reserve additions due to drilling.
- Drilling activity in 1989 was at its highest level since 1981.

Growth in Oil Reserves

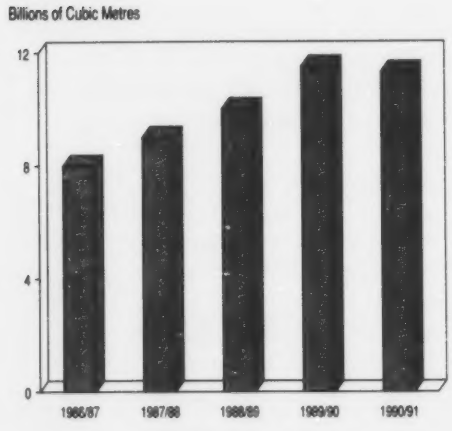


- Pool delineation and implementation of a pressure maintenance scheme in the Brassey field have resulted in significant reserve additions.
- 1989 reserve additions due to drilling and revisions were more than double annual oil production.

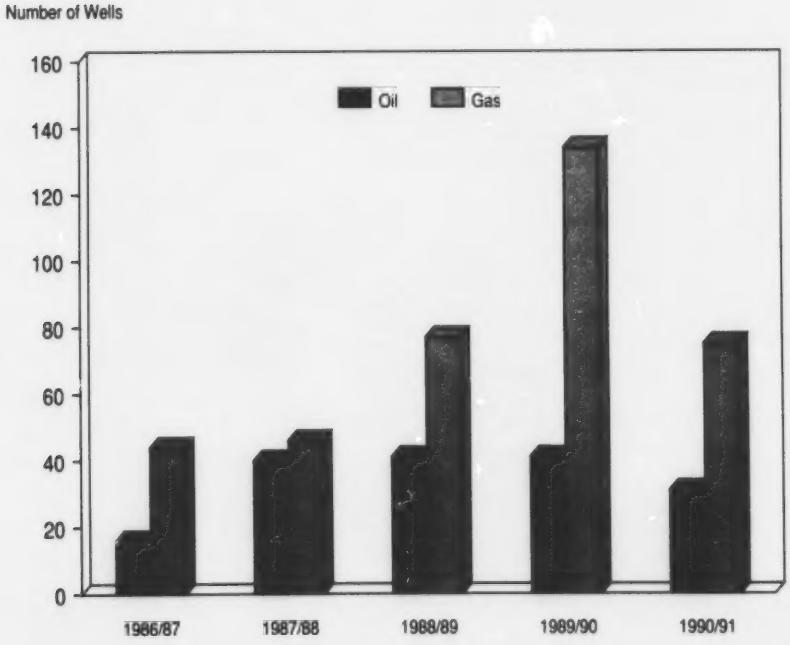
Oil Production



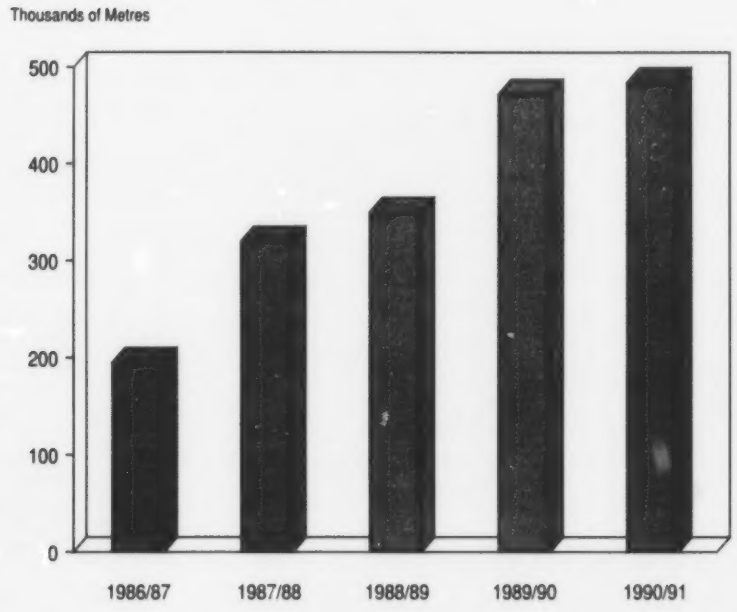
Marketable Gas Production



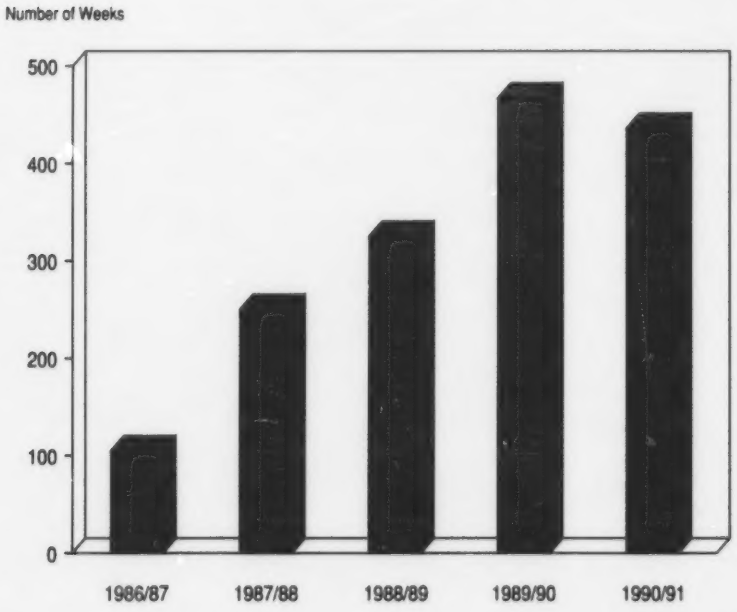
Number of Wells Drilled



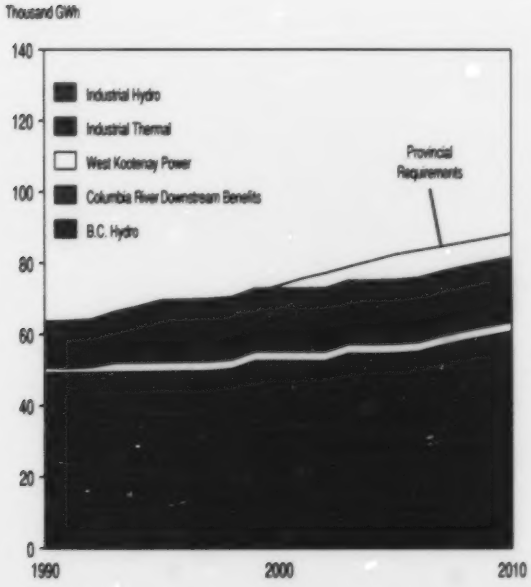
B.C. Petroleum Industry — Metres Drilled



B.C. Petroleum Industry — Geophysical Crew Weeks



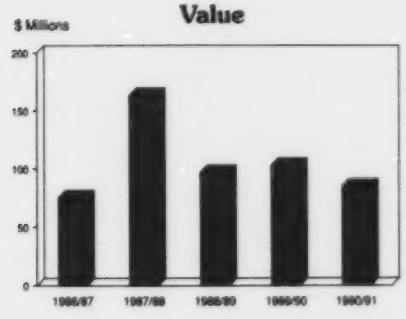
Electricity Supply and Requirements



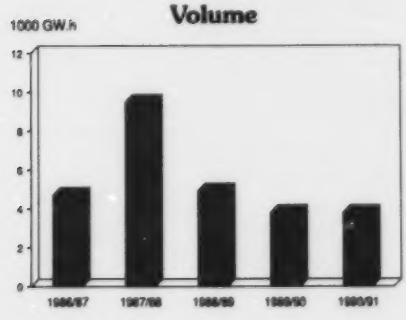
- In 1990, B.C. produced 61,000 GW.h of electricity.
- Hydroelectric generation accounts for 95 per cent of all electricity production in B.C.
- B.C. Hydro and West Kootenay Power are the major utilities and together produce 85 per cent of all B.C. hydroelectricity.
- Utility thermal generation is small but is expected to play a larger role.
- Exports have varied significantly over the past 10 years — the average level is 6,700 GW.h per year.
- Increased firm electricity exports are likely in the 1990s but will require improved access to markets in California.

B.C. Hydro Electricity Exports

Value

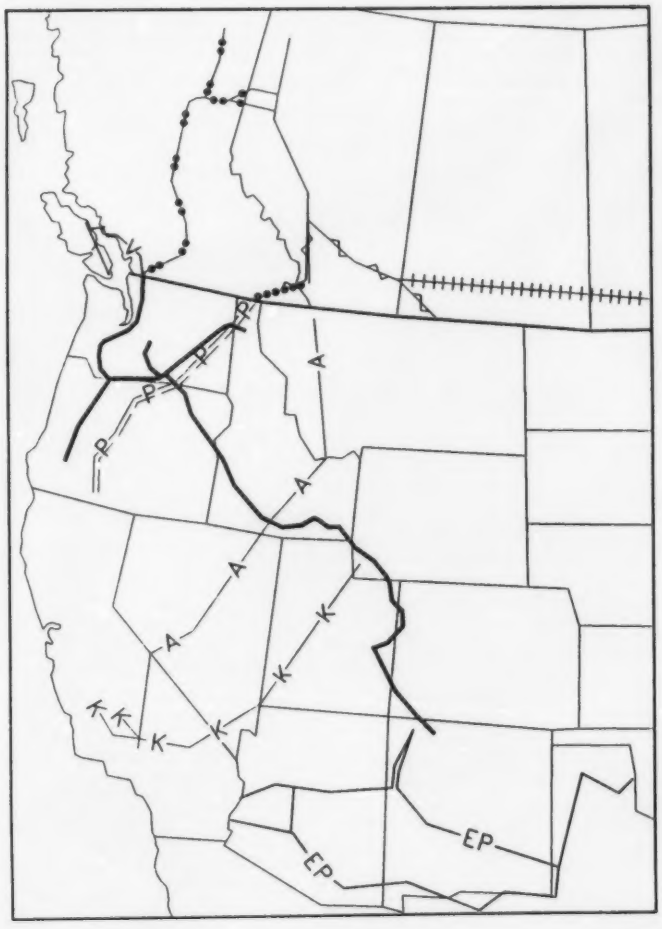


Volume



- B.C. Hydro has exported mainly interruptible electricity to the U.S.
- Interruptible exports are highly variable, and depend primarily on stream flow conditions in the U.S. and B.C.
- B.C. Power Exchange Corporation, a B.C. Hydro subsidiary, is responsible for marketing long-term firm exports from British Columbia.
- Wheeling, shaping, standby, and other services will be provided by B.C. Hydro to POWEREX.

Major Western North American Gas Pipelines



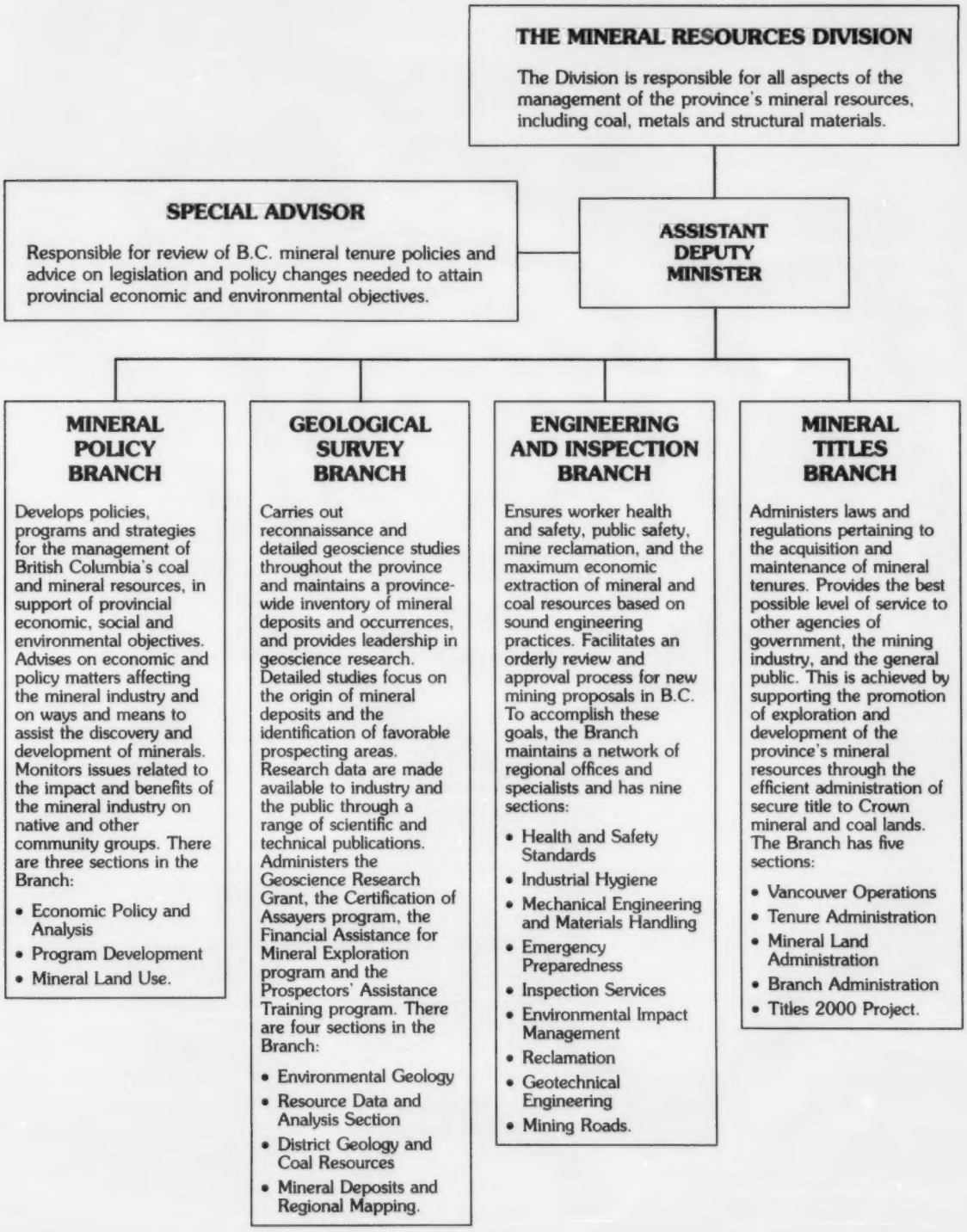
Existing Pipelines

- Westcoast Energy
- Foothills Pipe Lines
- Nova Corporation
- Alberta Natural Gas
- Transcanada Pipelines
- Northwest Pipeline
- Pacific Gas Transmission
- EP — El Paso

Proposed Pipelines

- A — Altamont
- V — Vancouver Island Pipeline
- P — P.G.T. Expansion
- K — Kern River

Mineral Resources Division


THE MINERAL RESOURCES DIVISION
The Division is responsible for all aspects of the management of the province's mineral resources, including coal, metals and structural materials.
SPECIAL ADVISOR
Responsible for review of B.C. mineral tenure policies and advice on legislation and policy changes needed to attain provincial economic and environmental objectives.
ASSISTANT DEPUTY MINISTER
MINERAL POLICY BRANCH
Develops policies, programs and strategies for the management of British Columbia's coal and mineral resources, in support of provincial economic, social and environmental objectives. Advises on economic and policy matters affecting the mineral industry and on ways and means to assist the discovery and development of minerals. Monitors issues related to the impact and benefits of the mineral industry on native and other community groups. There are three sections in the Branch:
• Economic Policy and Analysis
• Program Development
• Mineral Land Use.
GEOLOGICAL SURVEY BRANCH
Carries out reconnaissance and detailed geoscience studies throughout the province and maintains a province-wide inventory of mineral deposits and occurrences, and provides leadership in geoscience research. Detailed studies focus on the origin of mineral deposits and the identification of favorable prospecting areas. Research data are made available to industry and the public through a range of scientific and technical publications. Administers the Geoscience Research Grant, the Certification of Assayers program, the Financial Assistance for Mineral Exploration program and the Prospectors' Assistance Training program. There are four sections in the Branch:
• Environmental Geology
• Resource Data and Analysis Section
• District Geology and Coal Resources
• Mineral Deposits and Regional Mapping.
ENGINEERING AND INSPECTION BRANCH
Ensures worker health and safety, public safety, mine reclamation, and the maximum economic extraction of mineral and coal resources based on sound engineering practices. Facilitates an orderly review and approval process for new mining proposals in B.C. To accomplish these goals, the Branch maintains a network of regional offices and specialists and has nine sections:
• Health and Safety Standards
• Industrial Hygiene
• Mechanical Engineering and Materials Handling
• Emergency Preparedness
• Inspection Services
• Environmental Impact Management
• Reclamation
• Geotechnical Engineering
• Mining Roads.
MINERAL TITLES BRANCH
Administers laws and regulations pertaining to the acquisition and maintenance of mineral tenures. Provides the best possible level of service to other agencies of government, the mining industry, and the general public. This is achieved by supporting the promotion of exploration and development of the province's mineral resources through the efficient administration of secure title to Crown mineral and coal lands. The Branch has five sections:
• Vancouver Operations
• Tenure Administration
• Mineral Land Administration
• Branch Administration
• Titles 2000 Project.

Mineral Resources Division

The Mining Industry in 1990/91

The B.C. mineral industry experienced a slowing of demand and weakening metal prices through much of 1990/91. On average, prices for most base metals were below 1989 levels, and they continued to decline in early 1991. The lower prices, combined with high interest rates and a strong Canadian dollar, resulted in poorer financial performance for most producers. Exploration expenditures in 1990 are estimated at $143 million, slightly lower than the $150 million spent in 1989.

The total value of minerals produced in British Columbia in 1990 was $3 billion, down marginally from the 1989 value of $3.2 billion. Coal contributed over $1 billion to the overall total, and was the single largest mineral commodity in terms of revenue. Copper production, valued at $956 million, provided the largest share of total metal value.

While coal demand remained firm in 1990, a strong Canadian dollar relative to the U.S. dollar had a further negative impact on the financial condition of the coal industry. Coal production increased almost three per cent in 1990, and higher average nominal coal prices contributed to an increase of over seven per cent in the value of coal production.

Significant structural changes are occurring in the coal industry. An arbitration panel's ruling on the price of Quintette coal was made at the end of May, and Quintette filed a major restructuring plan at the end of 1990. In March 1991, Teck Corporation agreed to take over the management of Quintette from Denison Mines Ltd., subject to the approval of the secured lenders of Quintette and its directors.

Esso Resources Ltd.'s Byron Creek mine was listed for sale. When no suitable buyer was found, the operation was downsized in order to increase its efficiency. In February 1991, Shell Canada announced that it was seeking a buyer for its Line Creek mine.

Market access for the Quinsam thermal coal mine on Vancouver Island was enhanced by the upgrading of port facilities on Texada Island to allow the loading of panamax-size vessels. Quinsam began to develop an underground mine, in addition to its surface operation.

Copper prices began to weaken in October 1990 as economic activity slowed. However, significant exploration activity occurred on several promising deposits in the province. In northwestern B.C., Geddes Resources continued work on its Windy Craggy property. Exploration work also continued on two large, open pit copper-gold properties - Placer Dome's Mt. Milligan in north-central B.C., and Imperial Metals' Mt. Polley near Williams Lake. In November, it was announced that Nippon Mining and Sumitomo Corp. had agreed to finance the re-opening of Bethlehem Resources' Goldstream copper-zinc mine near Revelstoke.

The Brenda copper-molybdenum mine near Peachland was scheduled to close at the end of June due to reserve depletion. However, a rock slide in the pit advanced the closure date to June 8. Prior to the closure, the Chief Inspector of Mines formed a Public Surveillance Committee composed of provincial and local governments, Brenda personnel, as well as interested individuals and groups. The committee is monitoring and providing input to the progress of decommissioning and reclamation at the mine.

Brenda Mines received the Canadian Mental Health Association's award for "Excellence in Employee and Family Assistance" to recognize workplace initiatives to improve the overall well-being of their employees. Brenda took steps to identify employees' needs prior to the closure to ensure a successful transition to alternate employment. A comprehensive training program was established and an employee and family assistance program was introduced.

Cominco's Sullivan lead-zinc mine in Kimberley re-opened in November following a closure of more than nine months. The company completed an $11 million development program and instituted a new cost-efficient operating plan that could realize a 10-year mine life. Revisions to Cominco's new QSL lead smelter in Trail remained on hold throughout 1990/91 pending process test results taking place in Germany.

Cominco developed its Snip gold project during the year, and began production at the end of January. More than $25 million was spent on exploration of the Eskay Creek gold-silver property of Prime Resources and Corona Corp. A feasibility study is planned and commercial production could begin by 1994.

The Skyline gold mine closed in September and the Blackdome gold-silver mine closed at the end of December, due to depleted ore reserves. The Beaverdell silver mine closed at the end of February, after having been in production since 1898.

Princeton Mining Corp. completed the development of its McDame underground asbestos deposit in October. During the year, the Cassiar mill was operated using ore stockpiled from the closed open pit in addition to ore from the McDame development. A new feeder-breaker, designed to reduce oversize ore, was installed in the underground mine. The development of the deposit has extended the life of the mine by 16 years.

Highlights

Mineral Policy Branch

Following extensive industry/government discussions, the government agreed to provide financial assistance for the development of the Iskut Road on May 24, 1990. The road will provide access to the resource-rich Iskut Valley in the province's isolated northwest. Detailed engineering design and environmental studies were undertaken during the summer and fall of 1990. Field crews carried out geographical surveys, fish and wildlife assessments, geotechnical studies, river crossing investigations and archaeological field work to determine the most technically sound road alignment and to minimize potential environmental impacts. The $850,000 cost of the studies was shared equally between the provincial government, Cominco Metals and Prime Resources Group Inc. Results of the studies were incorporated into design and construction specifications. In March 1991, approval was given to provide financial assistance towards construction of the road. Construction, by Prime Resources, is expected to begin in the summer of 1991. The government intends that natives and other local interests will have the opportunity to participate in the construction and maintenance of the road.

The Branch's Land Use Policy Section prepared a discussion paper on proposed policies for mineral resources development in community watersheds. The paper was released at the Union of B.C. Municipalities annual meeting in September. The proposed policies recognize that protection of community water resources is a priority. The policies also recognize that mineral, coal, sand and gravel, and placer resources on Crown land in community watersheds should be available for responsible development to sustain a healthy mining industry.

During February 1991, the Land Use Policy Section co-ordinated the Ministry's involvement in an extensive public review process of government proposals for provincial park and forest wilderness study areas. As part of the Parks and Wilderness for the 90s program, open houses and public meetings were held in 103 communities to provide a venue for wide-ranging discussions of candidate "protected areas" in the province. Over 11,000 British Columbians attended these sessions. At the public meetings, Ministry staff illustrated the wealth of subsurface resources in B.C. and discussed how mineral and energy resource values will be assessed before any lands are withdrawn from the exploration land base.

During the year, the Land Use Policy Section also co-ordinated the expenditure of $100,000, provided by the Ministry of Parks, on mineral potential studies of Kakwa and Cascade Recreation Areas. The future publication of completed studies will commence the 10-year time-limited exploration period for these areas prior to government consideration of park status and boundaries.

The Branch participated on a federal-provincial working group sub-committee formed to investigate the issue of native participation in mining. A questionnaire which was designed to determine levels of aboriginal participation in mining, possible barriers to participation, and the costs and benefits of such participation was distributed to operators of seven proposed and existing mines. The federal Department of Indian and Northern Affairs will prepare and distribute a report summarizing the results of the committee's investigations.

In October, the government announced that it would fund a study of clean coal technology, along with the governments of Canada, Alberta and Saskatchewan, and the Coal Association of Canada. The feasibility study will examine the economic viability, costs, performance expectations, and environmental benefits of a new technology to reduce emissions when coal is burned to generate electricity. Called Integrated Gasification Combined Cycle (IGCC), the technology is expected to reduce carbon dioxide emissions and nearly eliminate the acid gas emissions normally produced by the burning of coal.

The Mine Closure Task Force, established in 1988, completed its work in January 1991 with the release of a report to the mayors and councils of all municipalities which have an economic base that is heavily dependent on the mining industry. The work of the task force will be followed by workshops for single industry resource towns, in order to explore strategies for community diversification. The workshops will be hosted by the Ministry of Development, Trade and Tourism.

On March 1, 1991, the Province announced its intention to renew the Canada/British Columbia Mineral Development Agreement. The agreement, commonly known as the MDA, funded a five-year, $10 million program to co-ordinate federal and provincial initiatives to strengthen and diversify B.C.'s minerals sector. The projects completed under this highly regarded agreement included geological studies, technology development, economic development studies, infrastructure planning assistance and public information campaigns. The agreement expired at the end of March 1990. Following the announcement to renew the program, negotiations were undertaken between federal and provincial government officials towards signing an agreement in time for field projects to proceed in the summer of 1991.

The Ministry announced an initiative to develop a coal strategy for B.C. The main objective is to identify ways in which the industry's contribution to the Province's goals can be enhanced.

During the year, the Branch continued to participate on the Resource Roads Task Force, chaired by the Ministry of Transportation and Highways. Draft legislation to rationalize the approach to resource roads in the province is under review by the task force members.

The Branch continued its work on the concept of mine-specific reclamation funds to address the situation of a single-mine company facing a significant, long-term reclamation expense. The Branch continued to consult with industry, and discussion with the federal government regarding tax implications of the funds is on-going.

Geological Survey Branch

The year was characterized by review and forward planning for the Branch as it focuses on the next decade. The Ministry invited the Canadian Geoscience Council to conduct an independent review of the Branch. The review was completed over the winter of 1989/90 and the final 100-page report was published in September 1990. One outcome of the review was an internal reorganization of the Branch.

The Branch expanded its mandate in 1990 by creating an Environmental Geology Section to provide geoscientific information on the environment and natural geologic hazards. The section comprises a Surficial Geology Unit, an Applied Geochemistry Unit, and an Analytical Sciences Unit.

The units work in a complementary and integrated manner to obtain data on the surficial environment. For example, in addition to drift exploration and placer gold programs, the surficial unit is involved in neotectonics and geologic hazards studies. A study of the active placer mines in the Cariboo mining area was completed, and research on analytical aspects of acid mine drainage was undertaken. Regional Geochemical Surveys (RGS) were expanded to include analyses of copper, lead, zinc, arsenic, mercury and cadmium in waters. These data will be instrumental in defining background concentrations and natural variability for baseline studies by the exploration industry, public health officials, and fish- and water-quality researchers.

The 1990 RGS survey covered the Fernie, Kimberley and Invermere areas of southeastern British Columbia. Water samples were collected in this survey as part of a co-operative project with the Ministry of Environment. The project was funded by the new Sustainable Environment Fund. Orientation surveys were conducted in the Mt. Waddington area, along the eastern margin of the Coast Mountains, in advance of the 1991 RGS sampling program. Parts of this area are candidates for wilderness protection and a modern database is required by explorationists and planners.

A new regional mapping project was initiated in 1990 in the northern Quesnel Trough. This area hosts the giant Mt. Milligan copper-gold alkalic porphyry. Although the area is heavily drift-covered, the work revealed a number of previously unrecognized plutons, sulphide-rich alteration halos and mineral showings, which may be clues to additional Milligan-type deposits.

Field work on the Rossland project was completed in 1990. The Rossland Camp is the second largest gold producer in B.C. and has traditionally been viewed as a mesothermal vein camp. This year's work has pointed out the potential for copper-gold skarns and shear-related alkalic porphyries. The most expensive, and probably one of the most ambitious Branch projects, a regional and metallogenic mapping project of the rugged Golden Triangle in the Iskut River area, was also completed in 1990. The project began in 1986, before the term Golden Triangle was coined for the area, before the discovery of the fascinating Eskay Creek deposits, and before the area was buzzing with helicopters. Work in 1990 concentrated on examining the numerous precious metal deposits in the camp.

In June 1990, the Industrial Minerals Unit began a study of the Mt. Brussilof magnesite deposit in southeastern B.C. This is a world-class deposit that produces 200,000 tonnes a year. The aim of the project is to determine the controls of mineralization and to develop an exploration model.

An airphoto study of the dimension stone potential of the southern Coast Range was contracted in 1990. The objective of the study is to locate large intrusions with favorable jointing patterns.

The Coal Resources Unit continued to study and compile data on the province's coals. The ongoing Coal Quality project sampled coals from producing mines. Laboratory studies focused on factors contributing to good coking coal, and on thermal coals and gasification feed stocks.

Coals in the Bowron Basin were sampled by shallow drilling and the coal measures in the Burnt River map sheet in the Northeast Coalfield were mapped. The Burnt River thermal coal deposit is located in the area. In addition, the area has potential for coalbed methane and for conventional petroleum. Vancouver Island coals also have potential for coalbed methane, and industry interest in this resource potential is growing.

The Prospectors Assistance and Training program was renewed in 1990/91. The $500,000 funding was used to promote prospecting activity by providing training, and financial and technical assistance to prospectors. The program supported two advanced training courses and contributed to several others. The 14th annual Advanced Prospecting Course was delivered April 24 through May 11, 1990, to a class of 32 students. The course is recognized as one of the best in Canada, and continues to improve each year. Eighty-six grants, up to a maximum of $7,500 per prospector, were awarded in 1990/91 to independent prospectors, to help them in their search for the mines of tomorrow.

The Branch's five district geologists continued to provide timely and informed advice to the Ministry's Mine Development Review Process, and on land use referrals. Although exploration activity decreased somewhat from the record levels of 1989, the district geologists continued with field studies in "hot" areas such as the Iskut-Stikine gold belt, the Omineca and Quesnel Trough copper-gold porphyry belts, and parts of the Okanagan Valley, Kootenay Mountains and Vancouver Island. The district geologists played instrumental roles in organizing regional meetings in Smithers, Kamloops, Stewart, Dease Lake and Wells.

The B.C. Geoscience Research Grant program was continued in 1990/91. This enabled the Ministry to support geoscience researchers from 15 different institutions in carrying out a total of 22 projects.

Results of these research programs were published in Paper 1991-1 Geological Fieldwork, and in other publications of the Geological Survey Branch.

Engineering and Inspection Branch

During 1990/91, 2,704 inspections of mineral and coal mines, exploration sites, placer mines, rock quarries and sand and gravel operations were performed.

A major safety audit was conducted at a large surface coal mine which resulted in recommendations for improvement in all aspects of mine safety. The audit was well received by both management and labor and similar safety audits will be performed at other mines in B.C.

A unique study on extended hours of work continued in collaboration with the U.S. Bureau of Mines and Simon Fraser University. This study has been described as the most extensive and ambitious piece of research of extended workdays of its sort attempted in the industrial sector and will be completed in 1991.

The Branch sponsored the Regional and Provincial Mine Rescue Competitions with total involvement of industry personnel as officials at the regional level, and increased participation of industry personnel as officials at the provincial competition.

The Mines Act and the Health, Safety and Reclamation Code were proclaimed in July 1990. Labor, industry, and academic members were appointed to a code review committee to ensure the legislation reflects technological changes in the industry.

Reclamation of mining disturbances has been required under the Mines Act for the past 21 years. In the late 1960s, the industry's major coal and base metal mines occupied less than 1,000 hectares in total compared to 29,915 hectares in 1990. In the same period 7,916 hectares (26 per cent) have been reclaimed.

To ensure that reclamation is carried out, the Branch collects a security deposit. Recent changes in the Mines Act and a review and adjustment of particular bonds has meant a substantial increase in the value of reclamation securities held by the Province. The total reclamation security has risen from a little over $10 million in 1985 to $64.6 million at the end of the 1990 fiscal year.

During the past year, the British Columbia Acid Mine Drainage (BCAMD) Task Force, chaired by the Branch, initiated five new projects and continued work on seven others. Projects were undertaken that will improve the existing BCAMD database; enhance our ability to predict and prevent acid mine drainage; and, improve the reliability of acid mine drainage monitoring. In addition, our knowledge of possible treatment and control methods for existing acid mine drainage problems was increased through a variety of projects including: research at the abandoned Mt. Washington and Britannia minesites to determine the most effective method of acid mine drainage treatment; the use of various techniques in waste rock dumps to control acid mine drainage generation; and, the use of wetlands as a medium to neutralize the effects of acid mine drainage. The task force also forms part of the national effort to solve the problem of acid mine drainage by co-ordinating efforts with the national Mine Environment Neutral Drainage (MEND) program.

A Mine Waste Dump Research Committee was formed to look at ways to protect B.C.'s environment through special attention to waste dumps and rock drains at mining operations. Its prime responsibility is to co-ordinate and foster research into design parameters, site investigation, monitoring techniques, operating techniques, failure runout analysis, impact barrier design, maximum flood level calculations, and other topics pertinent to waste dumps and rock drains.

The committee is also responsible for the transfer of knowledge and information obtained to mining companies, consultants and regulatory agencies to provide confidence that the province's mineral resources are developed in an environmentally sound manner. It currently has six projects in various stages of preparation.

The Mechanical Engineering and Materials Handling Section of the Branch noted evidence during 1990 of a shift towards higher capacity haul trucks at surface mines. Newer model trucks incorporate many of the design features developed over the years, and as a result, the vehicles tend to be more efficient in both productivity and safety-related systems. Braking systems continue to be highly reliable and cab environments are far more conducive to fatigue relief and ease of control for the operator.

Research was undertaken into particulate emissions from diesel engines operating in enclosed environments as they apply to underground mines. Respirable combustible dusts emitted as a consequence of the engine operation, and from background sources such as drill-oil mist, are believed to be harmful to persons working underground. With the co-operation of one of the larger underground mines, extensive testing was carried out on a platinum catalyzed ceramic filter capable of removing some 90 per cent of the respirable combustible dust produced by the diesel engine. The filter proved its removal capabilities and was able to regenerate its capture capabilities by "burning off" the trapped dust without creating harmful engine back-pressures.

Other research work into an obstacle-detection system, and a system for continuous tire-pressure monitoring was undertaken in co-operation with private research and development companies.

In a continued effort to enhance service to industry clients and to the public, development of the Mine Accident and Notices of Work computerized information systems progressed during the year. The Mine Accident Reporting system entered its prototype phase and was installed at two mines in B.C. Upon implementation, mine accidents recorded in this system will provide the basis for mine accident cause, frequency, and trend analysis. The Notices system was installed at the regional offices of the Branch, and will standardize the processing of Notices of Work.

In July 1990, the Province introduced the Mine Development Assessment Act, which formalizes the Mine Development Review Process. This legislation was considered necessary to:

- demonstrate the Province's commitment to thorough environmental assessments for all significant mine developments in British Columbia; and

- establish a legal basis for public consultation in the review process by upgrading the provisions for public consultation.

During 1990/91, 18 submissions were filed with the Mine Development Steering Committee. Projects that were prominent in the review process included: Mount Milligan copper/gold; Windy Craggy copper/cobalt/gold/silver; Fording Coal's Henretta Dragline Proposal; Telkwa coal; Crystal Peak garnet; Eskay Creek gold; Quesnel River gold; Mount Polley copper/gold; and Cirque lead/silver/zinc.

Five projects received approval-in-principle and advanced to Stage III (the permitting and licencing stage):

- the Quesnel River Gold Project, which received approval-in-principle in July 1990;
- Silbak Premier Gold — Province Zone, which received approval-in-principle in August 1990;
- the Vine Gold Project (bulk sample), which received approval-in-principle in January 1991;
- Lussier Gypsum — South Pit Expansion, which received approval-in-principle in February 1991; and
- Silbak Premier Gold — SB Zone, which received approval-in-principle in March 1991.

The six regional mine development review committees, which are based in Nanaimo, the Lower Mainland, Kamloops, Fernie/Nelson, Prince George and Smithers, co-ordinated a number of project reviews. These included the review of: the Cheni gold — BV deposit; Line Creek Extension; Vine gold; Byron Creek — South Extension; Quesnel River gold; and Harmer West Extension coal.

Mineral Titles Branch

Some amendments to the Mineral Tenure Act resulting from Bill 90 (1989) were proclaimed in 1990/91. Changes to the Act include the following provisions:

- staking shall not commence until 7 a.m.;
- a "locator" is more clearly defined;
- rights and responsibilities of free miners are clarified; and
- the requirement to have a valid free miner certificate to hold title is reduced.

A new Mineral Titles Recording Policy and Procedures Manual was released to all Government Agent and Mineral Titles Recording offices in January 1991. This manual enhanced the function of recording mineral title documents by providing detailed explanations of policies and office procedures. This resulted in an improvement in the quality of service offered to the mining industry.

The planning phase of the Titles 2000 initiative was completed, and development of the new mineral tenure system commenced this year. Release I of the Mineral Data Administration (MiDA) system was implemented. This release allowed gold commissioners and government agents to update and query a single province-wide database of free miner certificate information. In addition, computer mapping workstations were purchased for use in converting the 3,000 manually drawn claim maps to computer-generated claim maps. The drafting office is scheduled to be in full production of computer-based maps by mid-1991.

Microfiche readers and map printers were installed in the Gold Commissioner offices in Nelson, Quesnel and Smithers. These will allow recording staff to provide local access to microfilmed records and reports, and issue copies of full scale claim maps.

The Branch recorded 10,496 claims in 1990/91. This level of activity represents a decrease of 29 per cent from 1989/90. The decrease is partly explained by a 1989 staking rush which occurred approximately 95 kilometres north of Stewart. More than 60 complaints were filed under Section 35 of the Mineral Tenure Act. During the summer and early fall of 1990 Ministry inspectors reviewed these complaints. To date, 35 of the disputes have been resolved by the Chief Gold Commissioner, and of these, 12 decisions are under appeal to the Supreme Court. The balance of the disputes will be resolved by mid-summer 1991.

The Branch is currently conducting a review of its tenure policy in order to develop a more effective method of acquiring and maintaining title to mineral claims in the province. This review has been prompted by a need to evaluate the impact of the recent Eskay Creek disputes on the security of mineral tenure in B.C.

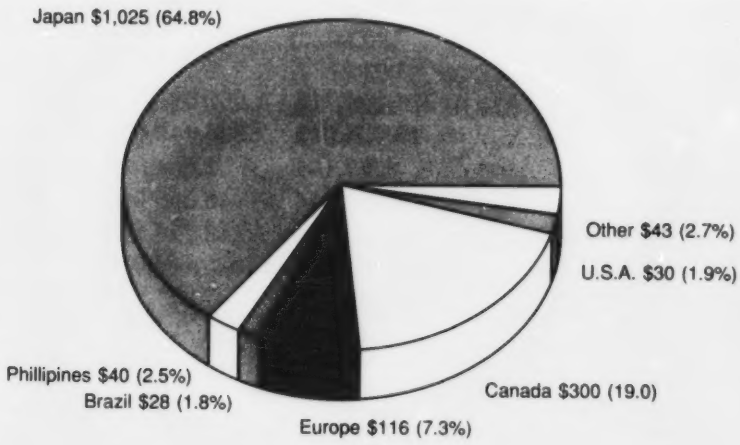
Restructuring of the Mineral Titles Branch was completed in this year. The Branch is now divided into several business units, each with measurable performance criteria. These units are:

- Vancouver Office — Supports the operation of all Gold Commissioner offices and oversees the investigation of disputes.
- Tenure Administration Office, Victoria — Ensures that mineral legislation, policy and procedure information is timely and available to each recording office.

- Mineral Land Administration Office, Victoria — Maintains mineral claim maps which depict the status of mineral claims. This unit also ensures that all mineral lands in B.C. are correctly classified with respect to the availability of the land for staking.
- Branch Administration, Victoria — Provides administrative and financial support services to the Branch and ensures government standards are met.
- Titles 2000 Project — Three-year project designed to automate the title recording and claim mapping functions. The project will provide regional access to titles information from any Government Agent office in B.C.

Destination of Metals Shipped from B.C. Mines in 1990 ($ Millions)

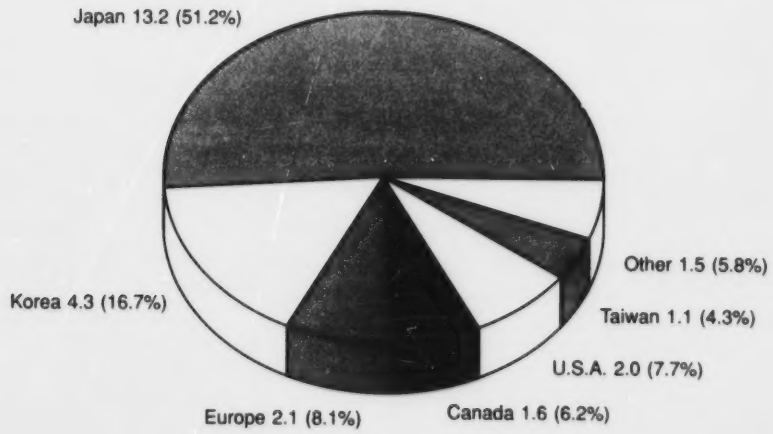
Total Foreign $1,282 Million
Total Sales $1,582 Million



NOTE: All figures are preliminary; metals are shipped in ores/concentrates.

Destination of Coal Shipped from B.C. in 1990 (Million Tonnes)

Total Foreign 24.2 Million Tonnes
Total Sales 25.8 Million Tonnes



NOTE: All figures are preliminary.

Mineral Production in British Columbia, 1989 and 1990

	1989 Actual Final		1990 Estimate	
	Quantity	$ Value	Quantity	$ Value
Metals				
Copper kg	303,199,718	1,002,528,683	346,132,000	956,370,000
Gold g	15,486,013	236,449,039	16,443,000	249,016,000
Iron Concentrates t	73,144	2,861,520	103,000	3,867,000
Lead kg	68,369,344	46,266,966	23,658,000	21,748,000
Molybdenum kg	13,617,712	112,274,115	13,481,000	98,906,000
Silver g	493,844,443	105,442,581	637,010,000	131,046,000
Zinc kg	120,496,624	241,011,125	61,418,000	114,270,000
Others	—	10,581,677	—	7,012,000
Total Metals		1,757,415,706		1,582,235,000
Industrial Minerals				
Asbestos t	109,180	58,267,878	96,000	52,639,000
Sulphur t	473,665	51,806,874	480,000	50,408,000
Others	—	14,679,550	—	14,009,000
Total Industrial Minerals		124,754,302		117,056,000
Structural Materials				
Cement t	1,483,667	112,625,000	1,324,000	101,806,000
Sand and Gravel t	50,787,750	151,235,111	51,000,000	153,000,000
Others	—	32,889,923	—	36,126,000
Total Structural Materials		296,750,034		290,932,000
Coal				
Metallurgical Coal t	21,944,673	894,660,452	22,402,000	953,961,000
Thermal Coal t	3,189,525	88,616,328	3,407,000	104,670,000
Total Coal	25,134,198	983,276,780	25,809,000	1,058,631,000
Total Solid Minerals		3,162,196,822		3,048,854,000

Provincial Revenue from the Mining Industry ($ Thousands)

	1986/87	1987/88	1988/89	1989/90	1990/91*
Miscellaneous Mining Receipts	6,530	7,366	7,120	8,323	8,300
Coal Royalty	24,087	22,795	24,724	12,758	—
Mineral Land Tax	16,507	12,215	12,656	12,262	10,700
Mineral Resource Tax	8,016	10,418	26,431	36,994	3,500
Mineral Tax	—	—	—	—	17,500
Mining Tax	445	792	3,719	3,186	7,000
Totals	55,585	53,586	74,650	73,524	47,000

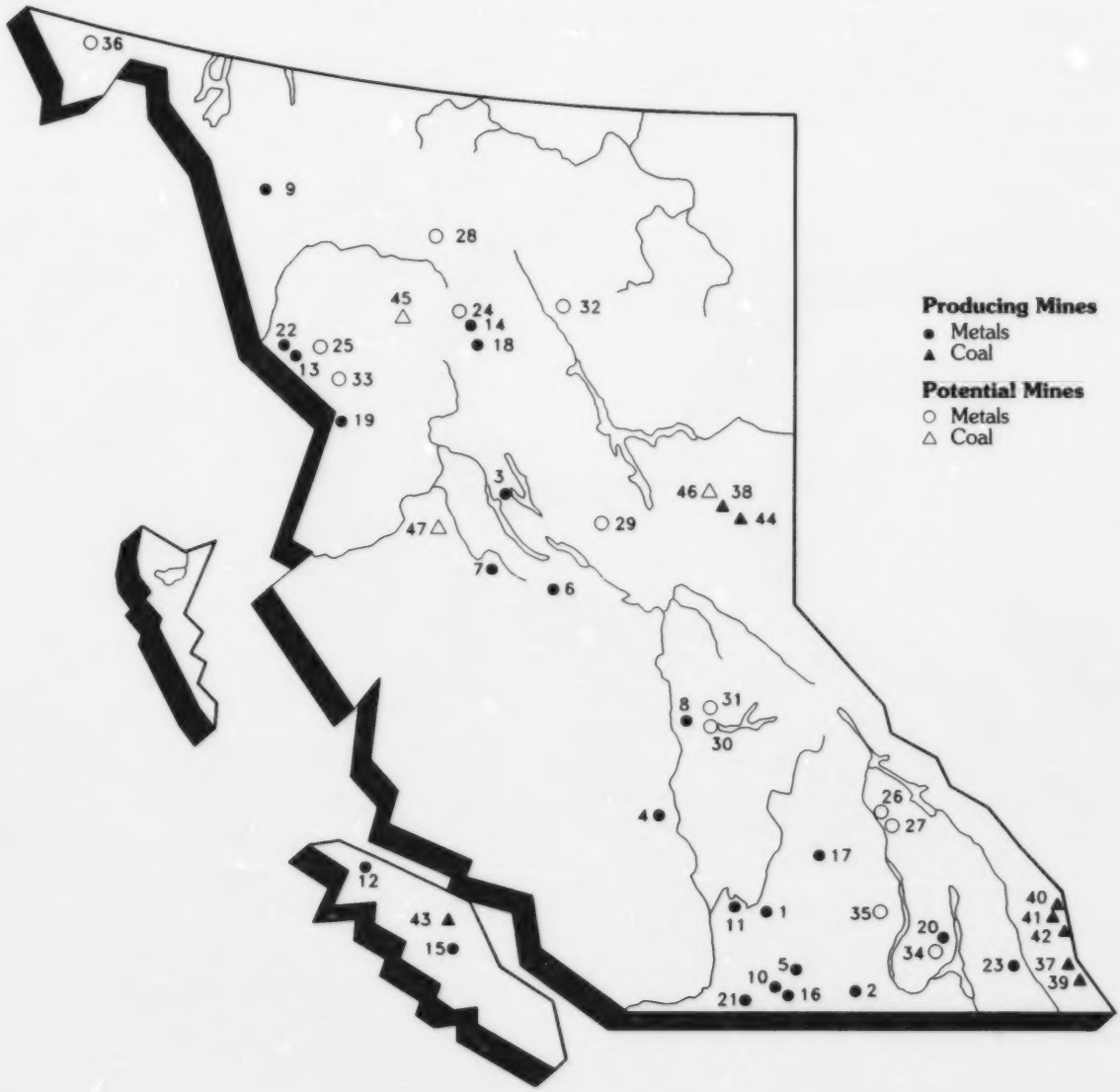
NOTE: * Forecast. Reduction in revenue in 1990/91 is due to the implementation of the new Mineral Tax Act. The Act recognizes that all current and capital costs are 100 per cent deductible in the fiscal year in which they are incurred or carried forward. These costs were subject to limits on deductibility under the previous legislation.

Employment in the Mineral Industry in British Columbia 1986 to 1990

	Metal Mines and Smelters	Coal	Structural Materials	Industrial Minerals	Other	**Totals**
1986	7,712	5,210	983	419	3,650	17,974
1987	8,380	5,144	1,069	411	6,320	21,324
1988	9,149	5,225	1,100	385	4,500	20,359
1989	9,286	5,618	1,200	354	3,500	21,947
1990*	8,800	5,570	1,300	400	3,500	21,560

NOTE: * Estimate. Employment as reported on Annual Census of Mines, Quarries and Sand Pits. Other includes estimate for all other direct employment not reported, including exploration, drilling, trucking, construction and placer mining.

Major Producing and Selected Potential Metal and Coal Mines, 1990/91



Major Producing and Selected Potential Metal and Coal Mines, 1990/91

Producing Metal Mines

1. Afton (Cu, Au, Ag)
2. Beaverdell (Ag, Pb, Zn)
3. Bell (Cu, Au, Ag)
4. Blackdome (Au, Ag)
5. Brenda (Cu, Au, Ag, Mo)
6. Endako (Mo)
7. Equity (Ag, Au, Cu)
8. Gibraltar (Cu, Au, Ag, Mo)
9. Golden Bear (Au, Ag)
10. Hedley Tailings (Au)
11. Highland Valley Copper (Cu, Au, Ag, Mo)
12. Island Copper (Cu, Au, Ag, Mo)
13. Johnny Mountain (Au, Ag)
14. Lawyers (Au, Ag)
15. Myra Falls (Cu, Zn, Au, Ag)
16. Nickel Plate (Au)
17. Samatosum (Ag, Au)
18. Shasta (Au)
19. Silbak Premier/Big Missouri (Au, Ag)
20. Silvana (Pb, Zn, Ag)
21. Similco (Cu, Au, Ag)
22. Snip (Au, Ag)
23. Sullivan (Pb, Zn, Ag)

Potential Metal Mines

24. Al (Au)
25. Eskay Creek (Au)
26. Goldstream (Cu)
27. JL/Equinox (Au, Ag, Pb, Zn)
28. Kutcho Creek (Cu, Zn, Ag)
29. Mount Milligan (Cu)
30. Mount Polley (Cu)
31. Quesnel River (Au)
32. Stronsay (Pb, Zn, Ag)
33. Sulphurets (Au, Ag)
34. Willa (Au, Cu)
35. Windflower (Au)
36. Windy Craggy (Cu, Co, Au, Ag, Zn)

Producing Coal Mines

37. Balmer
38. Bullmoose
39. Byron Creek
40. Fording
41. Greenhills
42. Line Creek
43. Quinsam
44. Quintette

Potential Coal Mines

45. Mount Klappan
46. Sukunka
47. Telkwa

Major Industrial Minerals Operations, 1990/91

★ Production greater than 1,000,000 tonnes per year
● Production between 100,000 and 1,000,000 tonnes per year
▲ Production less than 100,000 tonnes per year
△ Potential producer under mine development review process
○ Recent past producer

Major Industrial Minerals Operations, 1990/91

Production greater than 1,000,000 tonnes per year

1. Blubber Bay (limestone)
2. Cassiar (asbestos)
3. Gillies Bay (limestone)

Production between 100,000 and 1,000,000 tonnes per year

4. Imperial (limestone)
5. Kamloops (limestone)
6. Lussier River (gypsum)
7. Mt. Brussilof (magnesite)
8. Mt. Moberly (silica)
9. Nanaimo (shale)
10. Nicholson (silica)
11. Pavillion Lake (limestone)
12. Windermere (gypsum)

Production less than 100,000 tonnes per year

13. Arthur Point (rhodonite)
14. Beaverdell (granite)
15. Benson Lake (limestone)
16. Bug Claims (limestone)
17. Cayoosh Creek (granite)
18. Craigmont (magnetite)
19. Crawford Bay (dolomite)
20. Dahl Lake (limestone)
21. Keremeos (rhodonite)
22. Kutcho Creek (jade)
23. Lost Creek (calcite)
24. Ogden Mountain (jade)
25. Oliver (silica)
26. Parson (barite)
27. Princeton (pyrophyllite)
28. Red Lake (fullers earth)
29. Rock Creek (dolomite)
30. Salmo (flagstone)
31. Slater Claims (limestone)
32. Squamish (granite)
33. Sumas Mountain (fire clay)

Potential producer under Mine Development Review Process

34. Argonaut (garnet)
35. Crystal Peak (garnet)
36. Hellroaring Creek (feldspar)
37. Moose Creek (magnetite)
38. North Bend (talc)

Recent past producers

39. Frenier (perlite)
40. Hill 60 (rhodonite)
41. Knight Inlet (granite)
42. Purden Lake (limestone)

Mineral Claims Staked By Mining Division — April 1, 1990 to March 31, 1991

Mining Division	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	**Totals**
Alberni	25	22	17	51	23	17	6	21	7	8	9	21	227
Atlin	28	57	35	22	37	75	83	14	3	10	3	60	427
Cariboo	55	127	130	121	97	124	100	31	25	22	39	37	908
Clinton	18	31	83	41	5	21	56	4	20	61	10	24	374
Fort Steele	69	62	185	113	53	87	60	67	25	29	20	23	793
Golden	11	27	19	16	27	26	20	28	—	—	20	—	194
Greenwood	113	43	80	20	27	59	35	18	14	11	10	—	430
Kamloops	79	120	115	108	44	25	43	10	40	37	30	60	711
Liard	42	125	163	139	152	73	46	35	1	5	92	103	976
Lillooet	14	9	33	10	27	42	11	2	—	6	14	10	178
Nanaimo	33	42	49	100	49	17	34	19	14	9	7	34	407
Nelson	35	51	218	114	34	24	24	15	18	8	10	18	569
New Westminster	43	33	19	22	23	30	41	9	21	25	15	22	303
Nicola	35	1	4	16	28	22	3	2	—	6	3	1	121
Omineca	141	271	194	216	161	120	186	32	45	69	105	223	1,763
Osoyoos	47	24	21	35	5	10	9	13	16	2	4	33	219
Revelstoke	6	33	9	5	4	22	5	11	6	—	2	4	107
Similkameen	22	46	15	43	42	22	60	6	13	21	18	40	348
Skeena	74	130	61	37	34	38	29	11	4	27	21	48	514
Slocan	31	27	27	18	35	3	16	27	4	—	34	30	252
Trail Creek	7	5	2	5	10	2	17	30	1	26	—	6	111
Vancouver	6	11	35	58	23	11	10	5	4	—	—	5	168
Vernon	13	38	15	5	33	13	6	3	4	1	53	4	188
Victoria	29	29	29	16	6	30	6	17	8	10	10	18	208
Totals	976	1,364	1,558	1,331	979	913	906	430	293	393	529	824	10,496